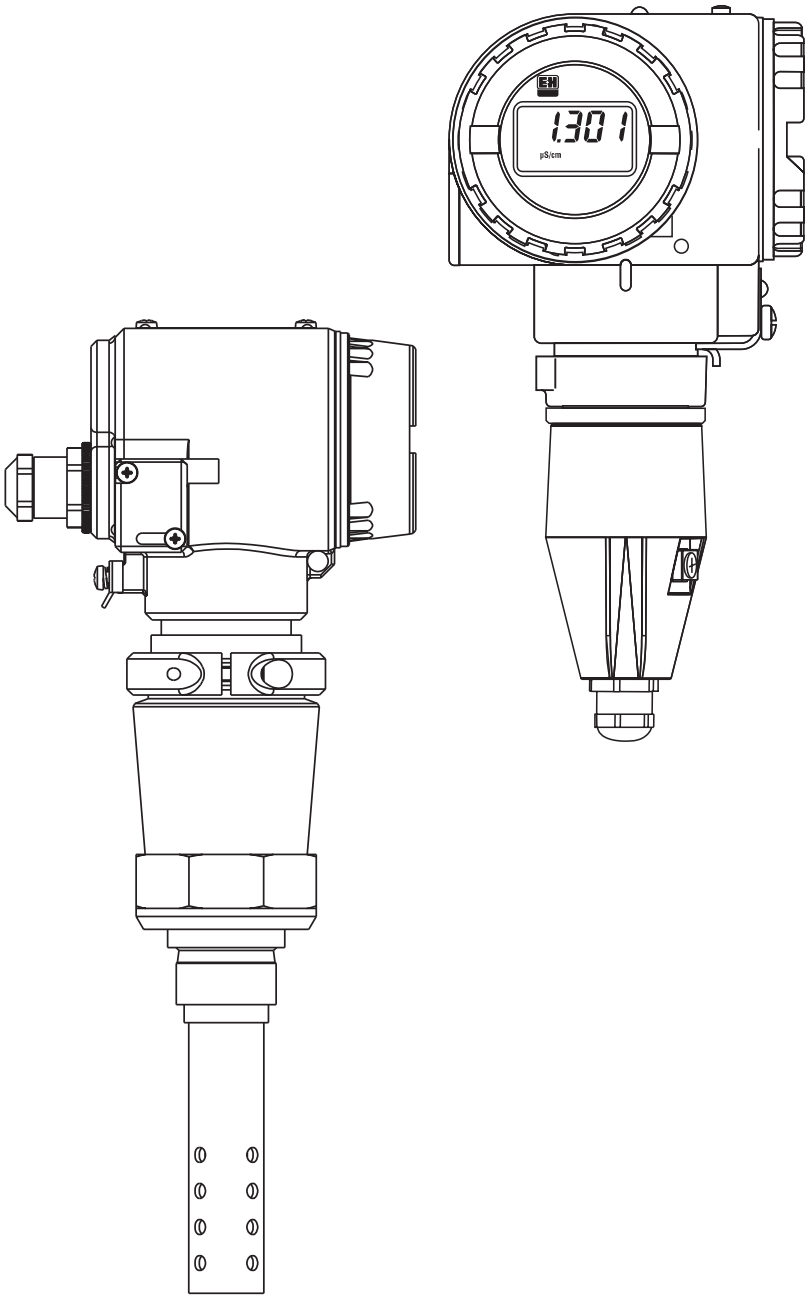
BA 202C/07/en/02.00
No. 51500561
Software version 2.00 or later

mypro
CLM 431 / CLD 431 Conductive Two-Wire Transmitter for Conductivity and Resistance

Operating Instructions



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Endress+Hauser

ISO 9001

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The Power of Know How

Please familiarise yourself with the instrument before you take any other steps:

General information

Safety

You wish to install and prepare the instrument for start-up. The required steps are described in these chapters:

Installation

You wish to operate or reconfigure the instrument. The operating concept is explained in these chapters:

Operation

Functional description

Interfaces

When you encounter problems or when the instrument requires maintenance, refer to these chapters for help:

Troubleshooting

Service and maintenance

Accessories

Technical data

LM431CE0.CHP

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1 General information

1.1 Symbols used

Warning:

This symbol alerts to hazards which may cause serious injuries as well as damage to equipment if ignored.

Note:

This symbol indicates important items of information. Ignoring this information may result in malfunction.

1.2 Storage and transport

The packaging material used to store or transport the instrument must provide shock protection. Optimal protection is provided by the original packaging materials.

Conformance with the ambient conditions (see Technical data) must be assured.

1.3 Unpacking

Verify that the packaging and contents are undamaged! Inform the post office or freight carrier of any damage. Damaged merchandise must be retained until the matter has been settled.

Check that the delivery is complete and agrees with the shipping documents and your order (refer to nameplate for type and variant).

The delivery includes:

MyPro CLM 431:

- Measuring transmitter MyPro CLM 431
- Housing fastening elements
- Prepared cable (depending on version)
- Operating instructions BA 202C/07/en
- Certificate of conformity (depending on version)

MyPro CLD 431:

- Measuring transmitter MyPro CLD 431 with measuring cell CLS 12
- Operating instructions BA 202C/07/en
- Certificate of conformity (depending on version)

Keep the original packaging materials for future storage or shipping of the instrument.

If you have any questions, consult your supplier or the Endress+Hauser sales agency in your area (see back cover of these operating instructions for addresses).

1.4 Packaging and disposal

Package the assembly properly for reuse at a later point in time. Optimal protection is provided by the original packaging materials.

Observe local regulations for disposal.

1.5 Product structure

You can identify the instrument variant by the order code on the nameplate.

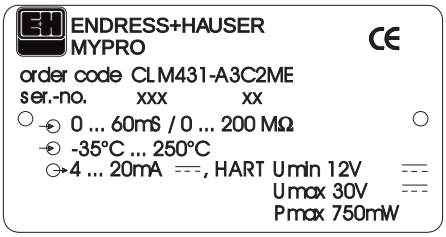


Fig. 1.1 Example of nameplate of CLM 431

MyPro CLM 431 conductive

Certificate type
A Version for non-Ex area
H Cenelec EEx ia/ib IIC T4 (dir. 76/117/EEC; dir. 94/9/EC)

Cable entry for power supply
1 Cable gland Pg 13.5
3 Cable entry M 20 x 1.5
5 Cable entry NPT ½ "
7 Cable entry G ½
8 Cable entry M 12

Electronics, communication, display
A 4 ... 20 mA, HART, without display
B 4 ... 20 mA, HART, liquid crystal display
C PROFIBUS-PA, without display
D PROFIBUS-PA, liquid crystal display

Accessories
1 No accessories
2 For wall and pipe mounting (DN 60)
3 For wall and pipe mounting (DN 30 ... 200)
4 With angle bracket for flange mounting

Preset measuring parameter
C Conductive, conductivity measurement
M Conductive, resistance measurement

Cable, measuring cell connection
A Without cable
C With CYK 71 cable, length 1 m
E With CYK 71 cable, length 2 m

CLM 431-							complete order code

Fig. 1.2 Example of nameplate of CLD 431

MyPro CLD 431 conductive

Certificate type
A Version for non-Ex area
H Cenelec EEx ia/ib IIC T4 (dir. 76/117/EEC; dir. 94/9/EC)

Cable entry for power supply
1 Cable gland Pg 13.5
3 Cable entry M 20 x 1.5
5 Cable entry NPT ½ "
7 Cable entry G ½
8 Cable entry M 12

Electronics, communication, display
A 4 ... 20 mA, HART, without display
B 4 ... 20 mA, HART, liquid crystal display
C PROFIBUS- PA, without display
D PROFIBUS-PA, liquid crystal display

Accessories
1 No accessories

Measuring cell, process connection and material
CA CLS 12, 0.04 ... 20 µS, G1, stainless steel 1.4571
CB CLS 12, 0.1 ...200 µS, G1, stainless steel 1.4571

CLD 431-					

complete order code

2 Safety

2.1 Intended use

The MyPro CLM 431 / CLD 431 is a field-tested and reliable measuring transmitter for determining the conductivity and specific resistance of liquid media.

In particular, the MyPro CLM 431 / CLD 431 is suitable for use in the following areas of application:

- Chemical industry
- Pharmaceutical industry
- Foodstuffs industry
- Drinking water treatment
- Condensate processing
- Municipal sewage treatment plants
- Industrial effluent treatment

The instrument design permits operation in explosive atmospheres (zone 1 according to ElexV).

2.2 General safety notes

This device has been manufactured for safe operation according to the state of the art in engineering and conforms to the applicable regulations and European standards (see Technical data). It has been designed according to EN 61010-1 and has left the manufacturer's works in perfect condition.

However, if used improperly or for purposes other than the intended purpose, it may be dangerous, e.g. due to incorrect connection.

- Operating this instrument in any way other than as described in these instructions may compromise the safety and function of the measuring system and is therefore impermissible.
- The notes and warnings in these installation and operating instructions must be strictly adhered to!

Warning:

2.3 Installation, start-up, operation

Warning:

- This device may only be installed, connected electrically, commissioned, operated and serviced by properly trained personnel authorized by the system operator.
- The personnel must be familiar with these operating instructions and must adhere to the instructions described therein.
- Before connecting the instrument to the mains, make sure that the mains voltage matches the voltage rating on the nameplate.
- When connecting an instrument in an explosive atmosphere, adherence to the applicable regulations is mandatory (see chapter 2.7).
- Check that all connections have been properly made before powering up the system!
- The instrument housing must be grounded before start-up!
- Damaged equipment that may be dangerous must not be operated and should be clearly identified as being defective.
- Any troubleshooting of the measuring system is to be performed exclusively by authorized, trained personnel.
- If faults cannot be remedied, the instrument must be removed from service and secured to prevent accidental start-up.
- Repair work must be carried out directly by the manufacturer or by the Endress+Hauser Service Organization.

2.4 Monitoring and safety features

Monitoring features

If a problem ever occurs, an alarm symbol flashes on the display, and a defined error current (22 mA +/– 0.5 mA) is output via the current interface.

Safety features

This instrument is protected against external influences and damage by the following design measures:

- Massive metal housing
- UV-resistant front panel
- Housing protection type IP 65

2.5 Immunity to interference

This instrument has been tested according to the applicable European standards for industrial applications with regard to electromagnetic compatibility and has been protected against electromagnetic interference (see Technical data in chapter 10).

Warning:

- The specified immunity to interference only applies for devices connected as outlined in these operating instructions.

2.6 Certificate of conformity

The MyPro CLM / CLD 431 transmitter has been developed and manufactured in accordance with currently valid European standards and directives and is suitable for use in hazardous areas.

Compliance with the harmonised European standards for the use of the equipment in hazardous areas is confirmed by this certificate of conformity.

Note:

For the CLM 431-G/H and CLD 431-H versions an EC conformity certificate is supplied. For the -H versions additional safety instructions (XA 173C/07/en) are supplied.

2.7 Notes for installation in hazardous areas

The MyPro CLM 431 / CLD 431 transmitter has been manufactured and tested in accordance with the harmonised European regulations (CENELEC) for »electric equipment for hazardous areas«. The equipment complies with the basic requirements of the 76/117/EEC and directive and is suitable for use in hazardous areas.

Warning:

- The applicable national regulations are to be observed for installation and operation.
- All lines conducting signals are to be shielded according to VDE 0165 and to be routed separately from other control lines.

Note:

For helpful information on the installation and operation of electric equipment in hazardous areas, please refer to the Endress+Hauser fundamental information brochure GI 003/11/d »Explosionsschutz von elektrischen Betriebsmitteln und Anlagen« (»Explosion protection of electric equipment and systems«). This brochure can be ordered from the Endress+Hauser sales offices.

3 Installation

3.1 Measuring system

The complete measuring system comprises:

- the MyPro CLM 431 transmitter
- a conductive two-electrode measuring cell with an integrated temperature sensor, e.g. CLS 12
- a measuring cable, e.g. CYK 71
- or the compact unit MyPro CLD 431 with conductivity measuring cell CLS 12

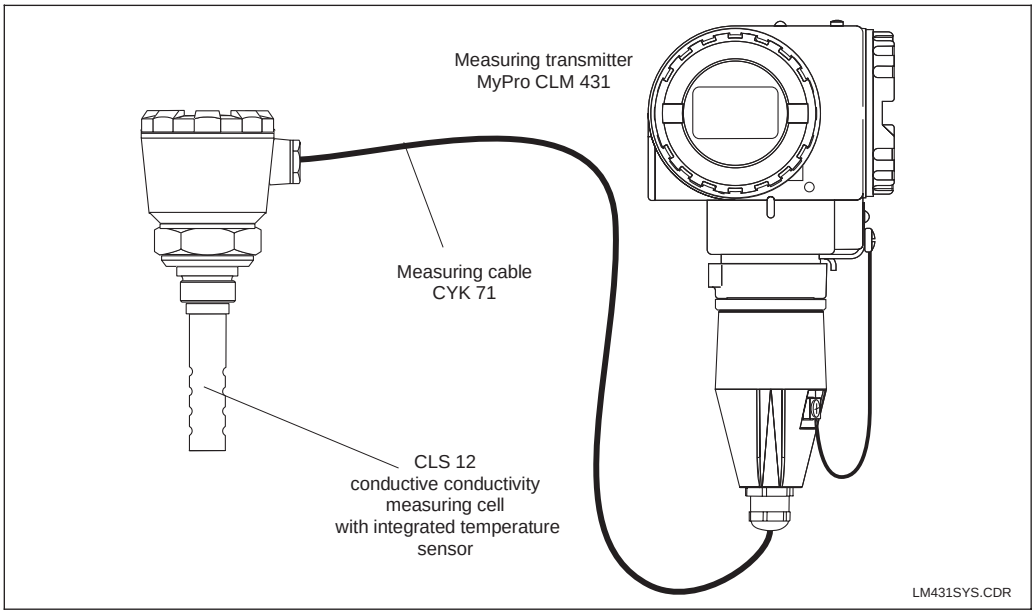


Fig. 3.1 Complete measuring system consisting of MyPro CLM 431 with measuring cable CYK 71 and conductivity measuring cell CLS 12

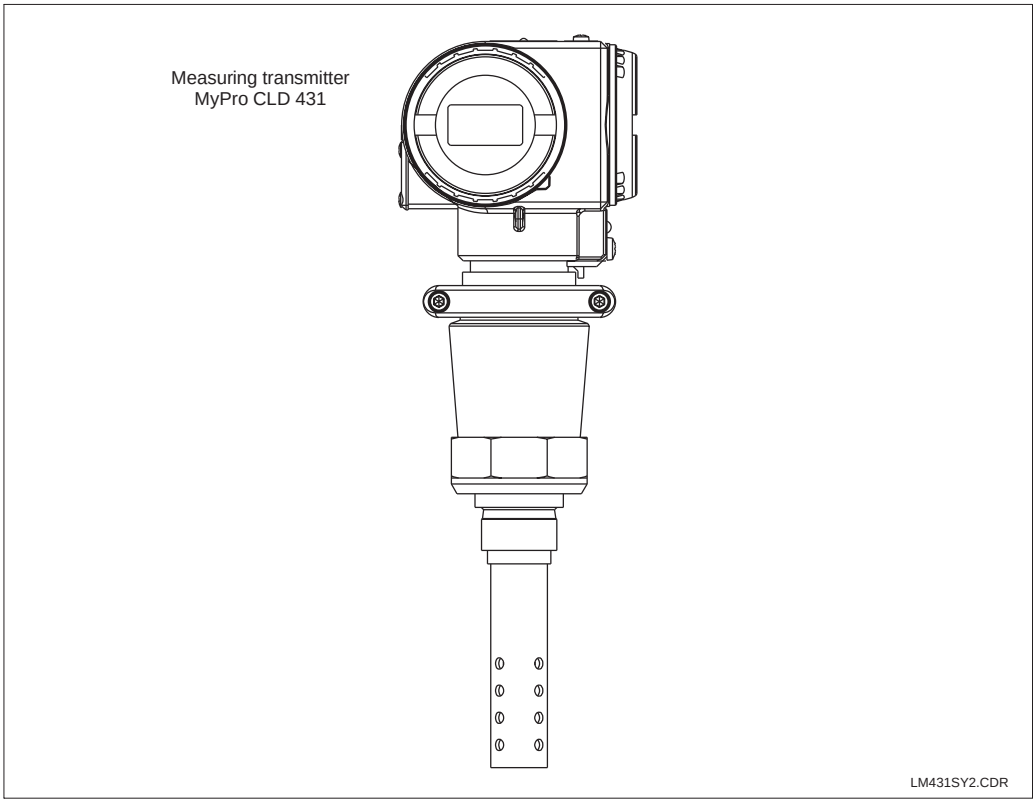


Fig. 3.2 Compact unit MyPro CLD 431 with integrated conductivity measuring cell CLS 12

3.2 Dimensions

3.2.1 MyPro CLM 431 conductive

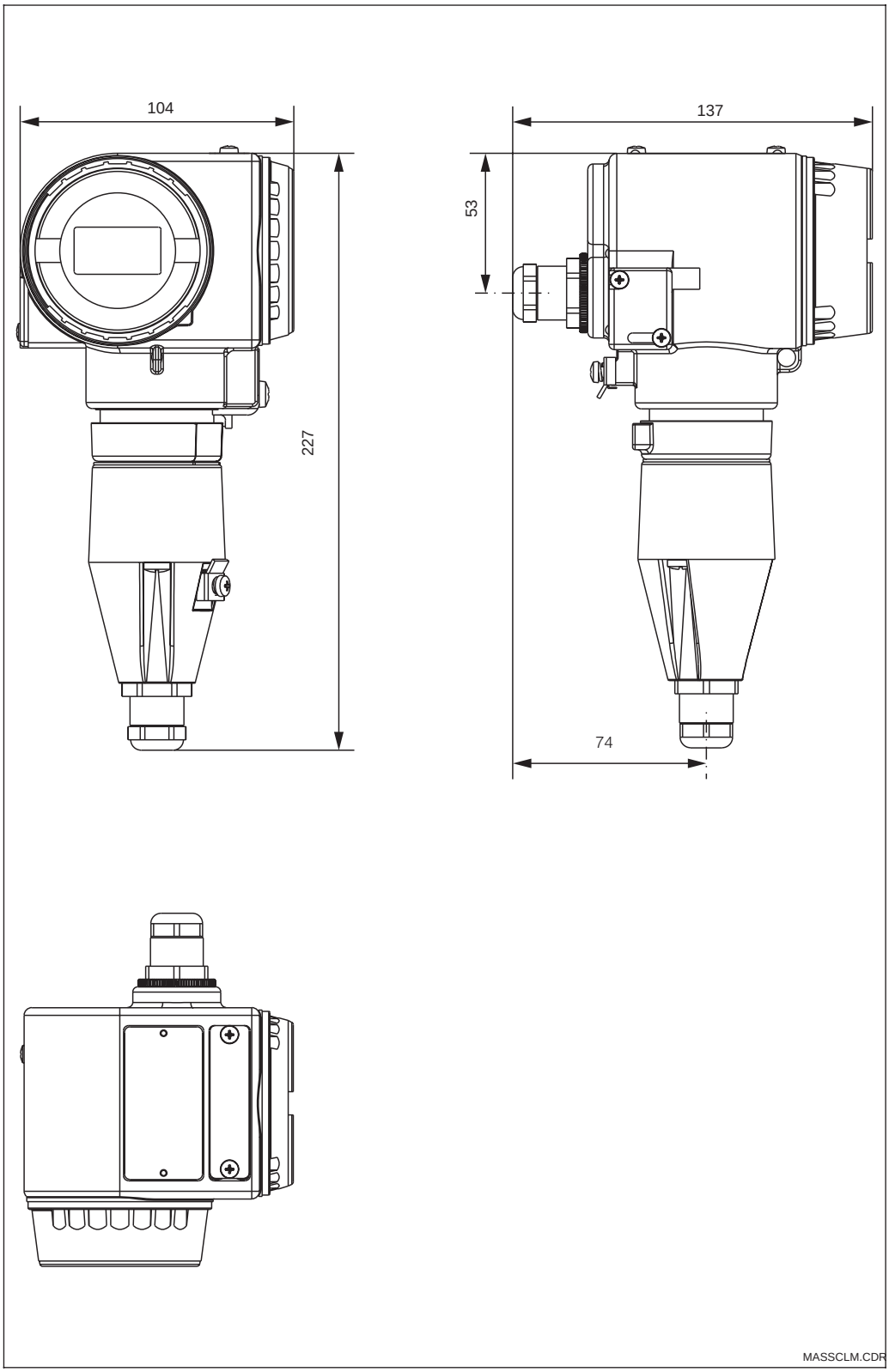


Fig. 3.3 Dimensions of MyPro CLM 431

3.2.2 MyPro CLD 431 conductive

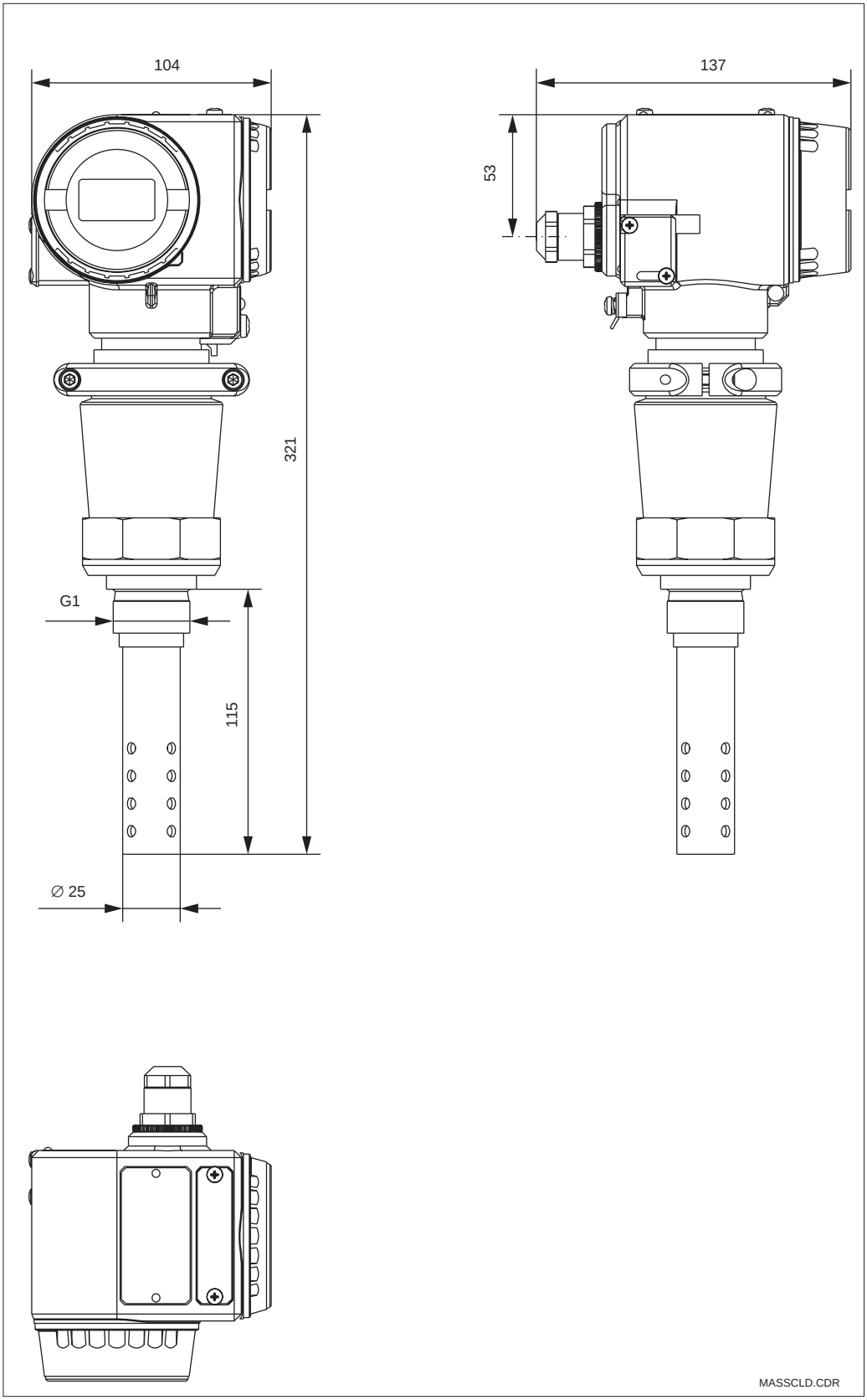


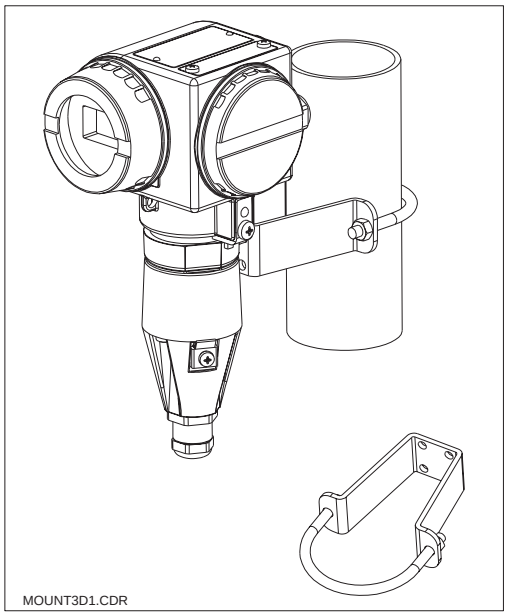
Fig. 3.4 Dimensions of MyPro CLD 431 with CLS 12

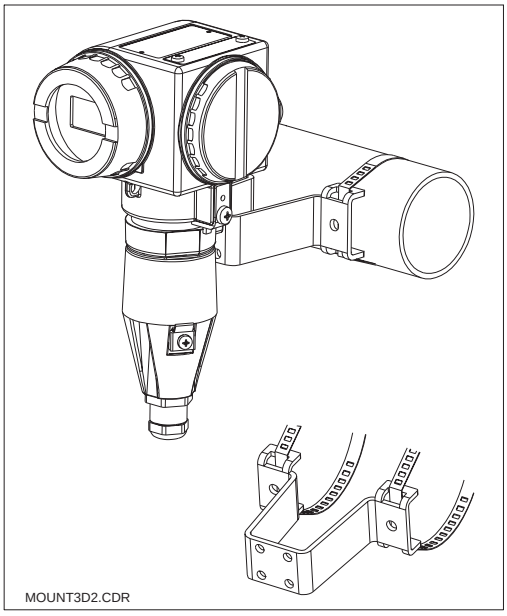
3.3 Mounting

3.3.1 MyPro CLM 431 conductive

The measuring transmitter MyPro CLM 431 can be installed on a wall or pipe using the holder (depending on version) supplied with the instrument.

The holder is attached to the MyPro housing with two screws. The housing can be rotated 90° thanks to four boreholes.

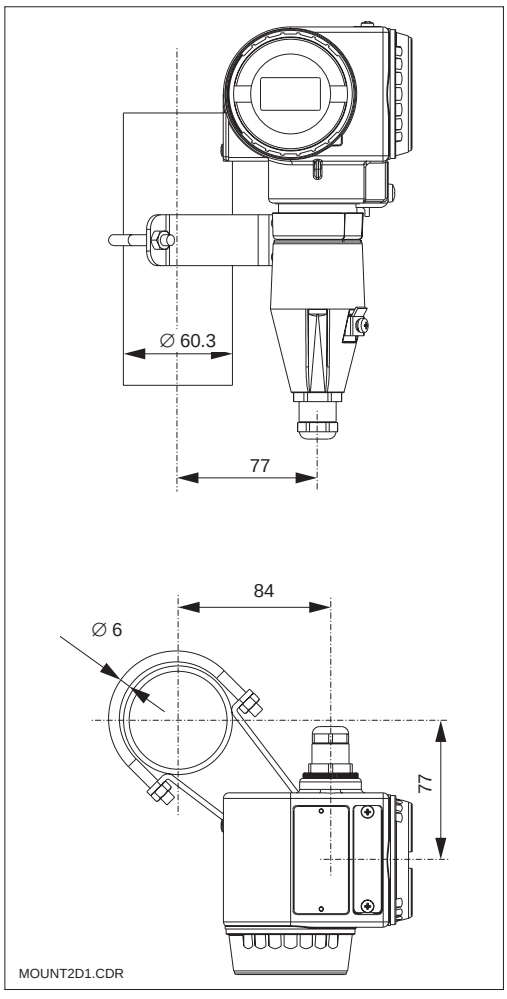


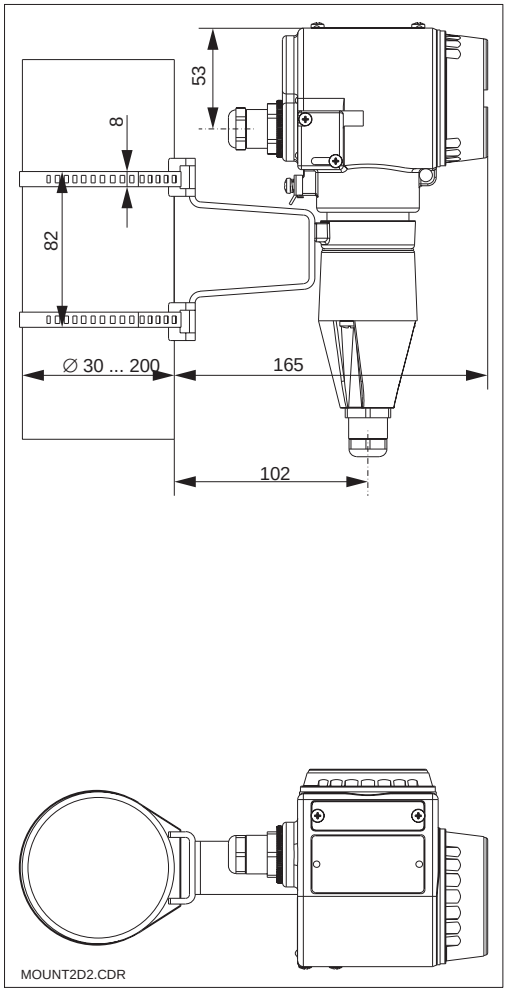


Left:
Pipe mounting DN 60, with mounting bracket

Right:
Pipe mounting DN 30 ... 200, with mounting bracket (horizontal attachment)

Fig. 3.5

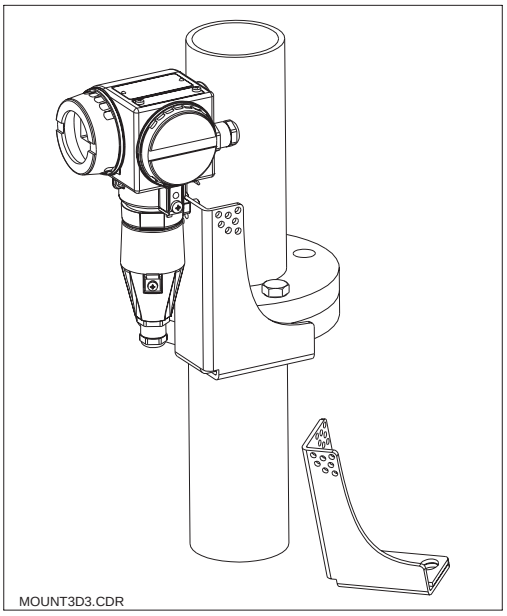


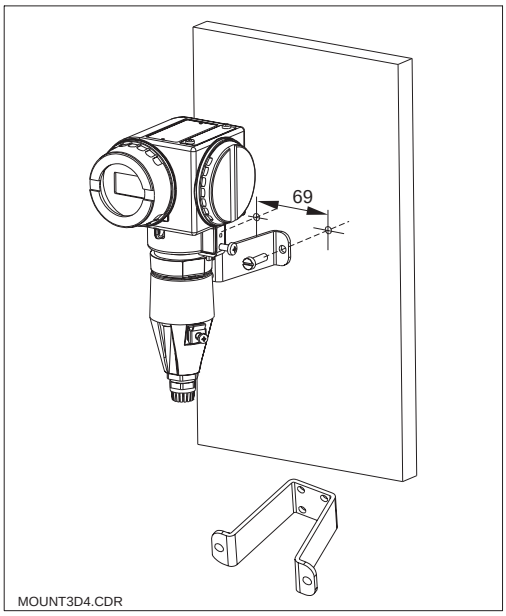


Left:
Pipe mounting DN 60, with mounting bracket

Right:
Pipe mounting DN 30 ... 200, with mounting bracket (vertical attachment)

Fig. 3.6

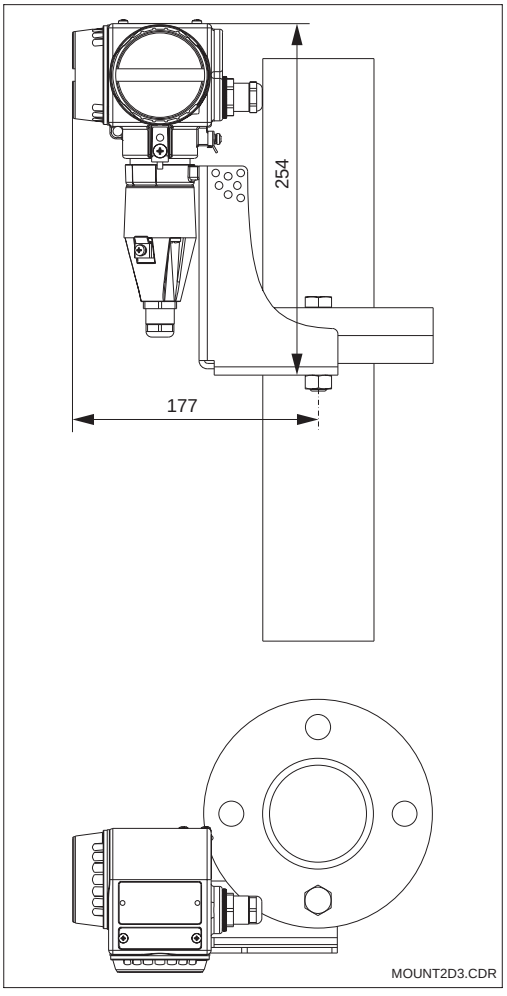


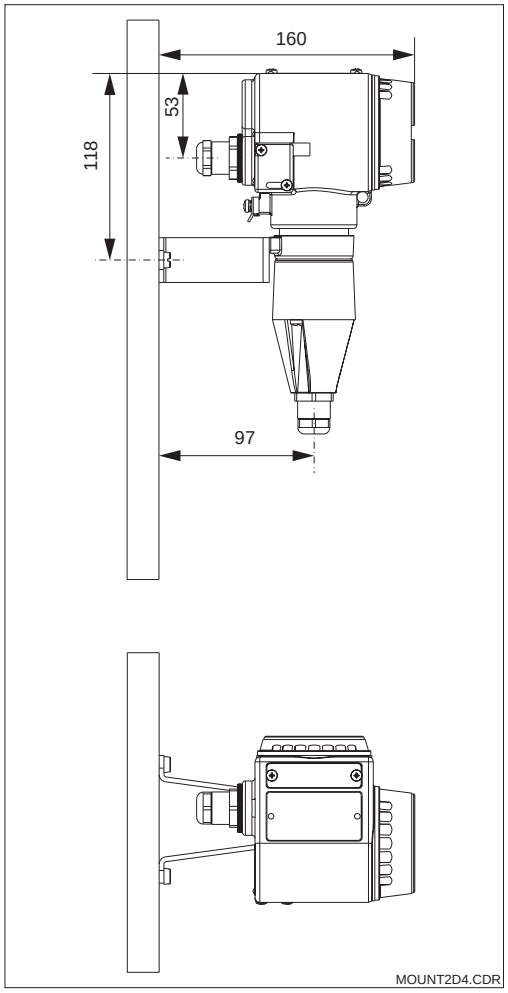


Left:
Flange mounting with angle bracket

Right:
Wall mounting with mounting bracket

Fig. 3.7





Left:
Flange mounting with angle bracket

Right:
Wall mounting with mounting bracket

Fig. 3.8

3.3.2 MyPro CLD 431 conductive

The compact version can be installed in a pipe with medium flow. The distance of the measuring cell from the inside pipe wall does not influence the accuracy of the measurement.

Note:

- The torque to fasten the thread must not exceed 25 Nm.
- Observe the temperature limits when installing the compact version (see Technical data, fig. 10.1).

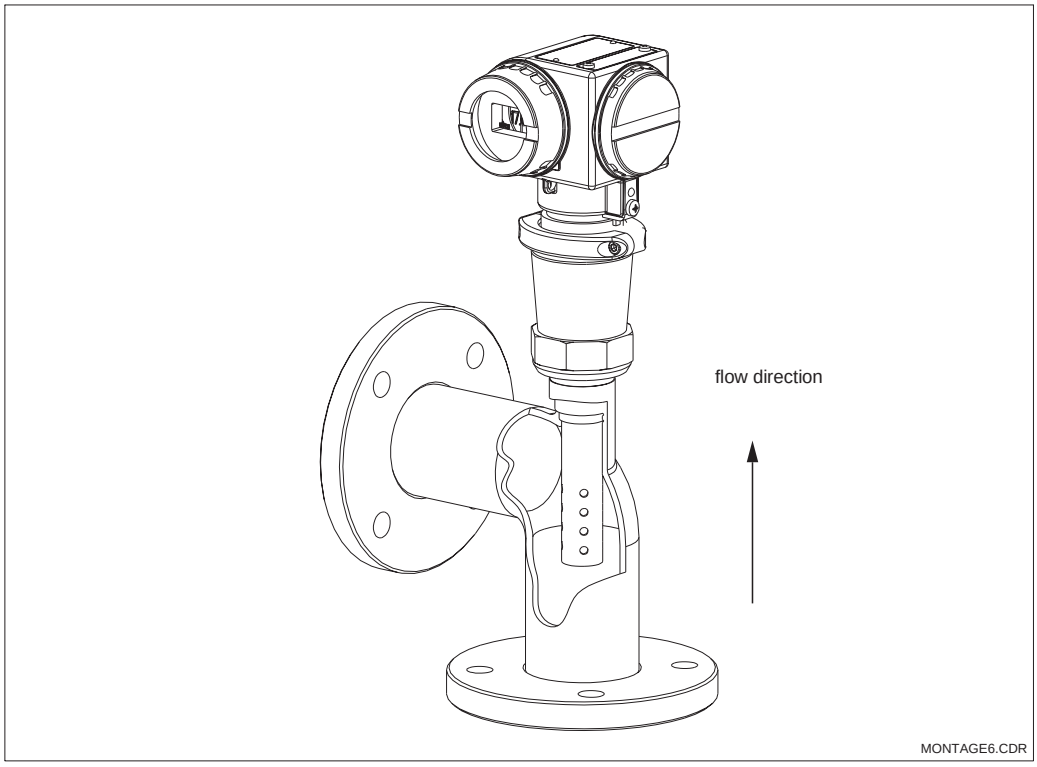


Fig. 3.9 Pipe mounting of MyPro CLD 431

3.3.3 Instrument orientation

Housing orientation

Following horizontal or vertical attachment to a wall or pipe, the orientation of the housing can be changed to provide optimal accessibility.

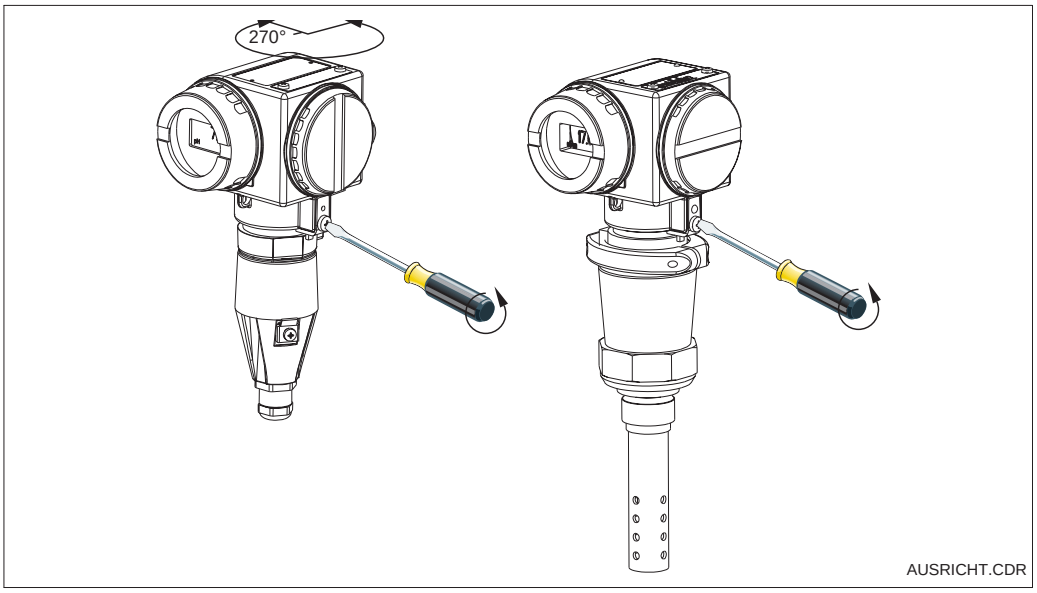


Fig. 3.10 Housing orientation

Left:
MyPro CLM 431

Right:
MyPro CLD 431

Note:

Pay attention to the keypad position during installation. The keys should be easily accessible.

Display rotation

The display can be rotated to permit perfect viewing in different mounting positions. It can be rotated in four 90° steps.

Refer to the figure below for the procedure to follow.

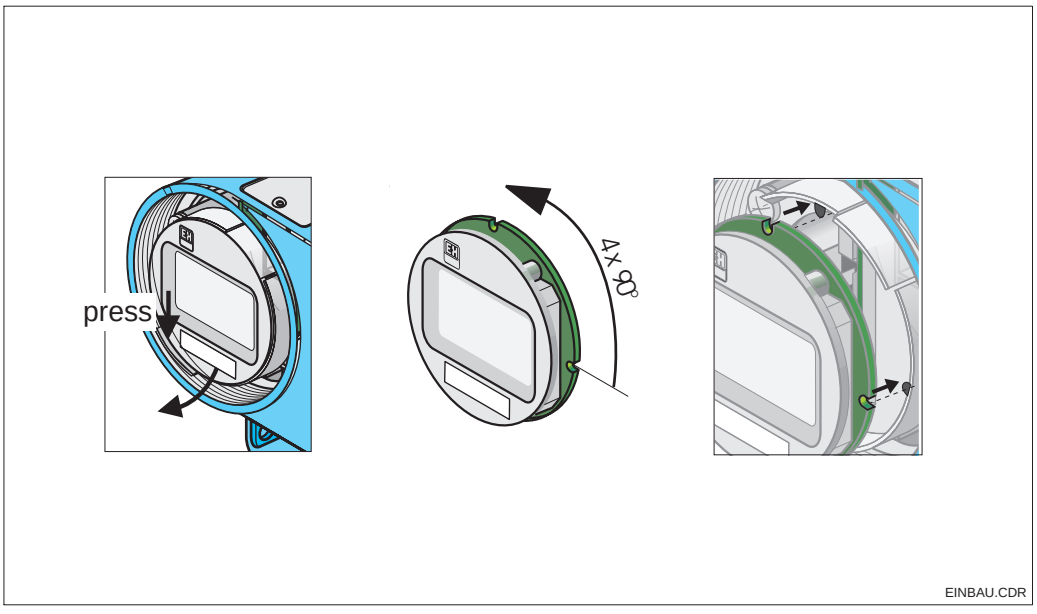


Fig. 3.11 Removal and installation of display

① Unscrew the lid over the display. Push the tab towards the outside.

② Tilt the display forward and remove.

③ Turn the removed display in 90° steps. Reinstall in the desired orientation.

④ To reinstall, latch the display back into the guide.

3.4 Connection of conductivity measuring cells

3.4.1 Suitable measuring cells

The following conductive conductivity measuring cells can be used for the measuring transmitter MyPro CLM 431:

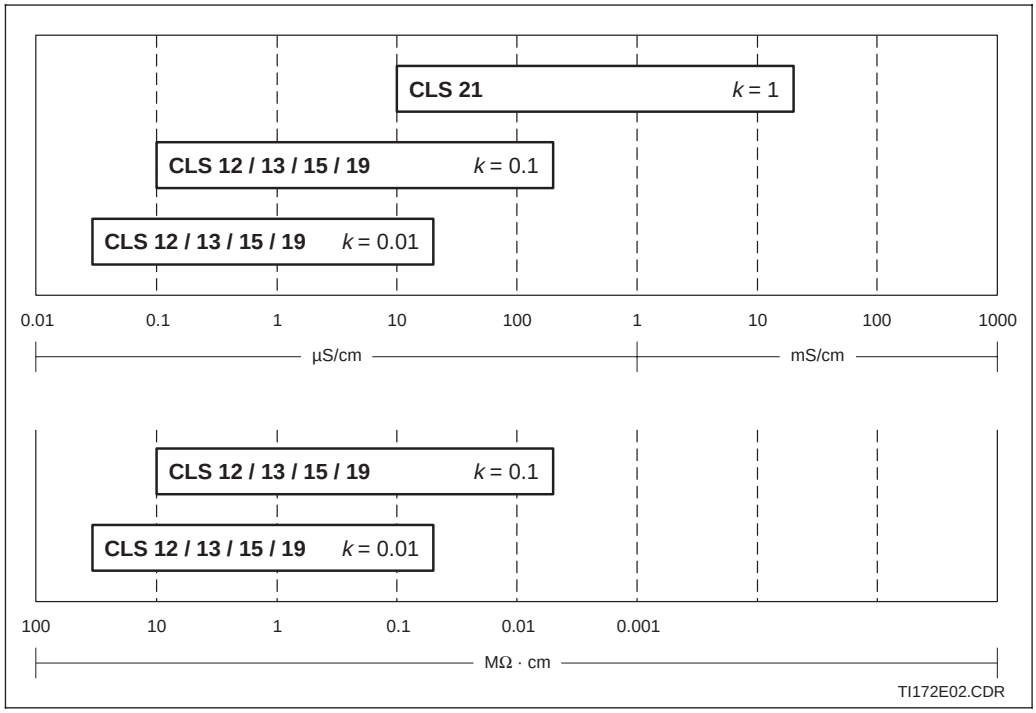


Fig. 3.12 Overview of suitable measuring cells with measuring ranges

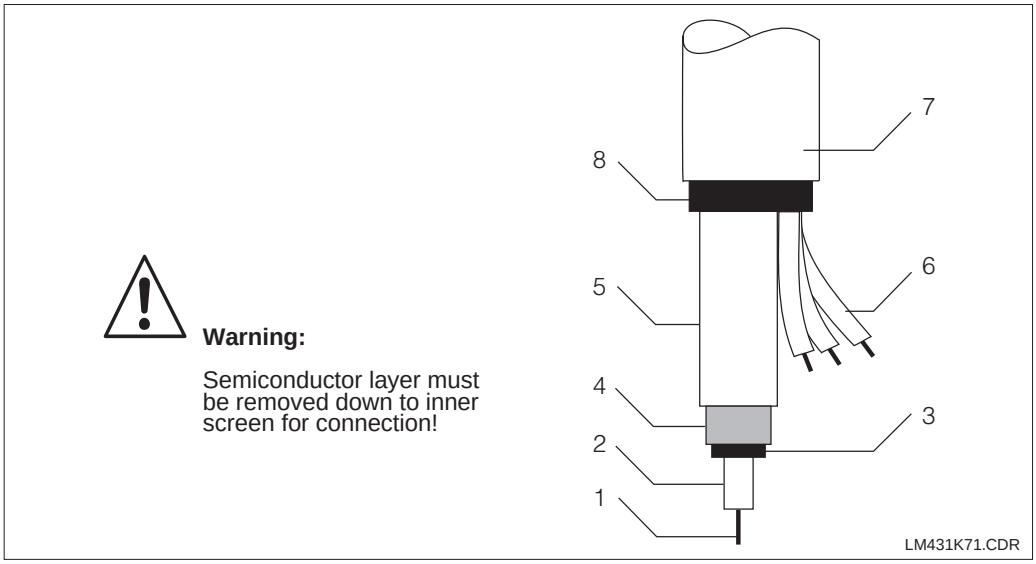
Note:

The measuring range depends on the application range of the measuring cells used.

3.4.2 Measuring cable connection

Conductivity measuring cells are connected by means of a special preassembled, shielded, multi-core measuring cable, type CYK 71. Should an extension of the measuring cable be necessary, use junction box VS in conjunction with extension cable CYK 71.

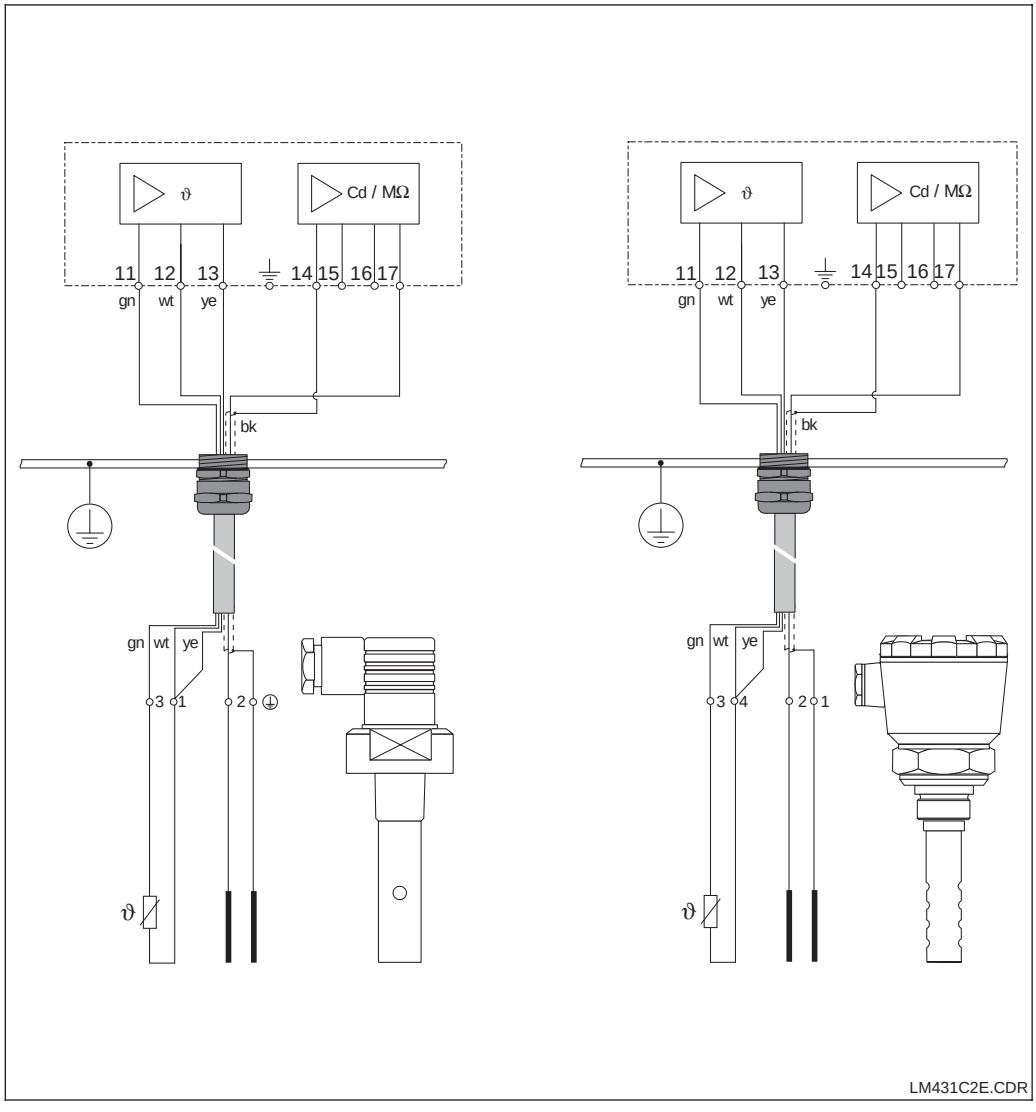
Construction and preparation of CYK 71 cable with examples for connection



Construction / preparation of special measuring cable CYK 71

1 Inner conductor (measuring signal)
2 Inner insulation
3 Black semiconductor layer
4 Inner screen (measuring signal)
5 2nd insulation
6 Auxiliary cores for Pt 100 (gn/wt/ye)
7 Outer insulation
8 Outer screen

Fig. 3.13



Connection examples

Left:
Connection of measuring cell CLS 19 with CYK 71

Right:
Connection of measuring cell CLS 12 with CYK 71

Fig. 3.14

Instructions for measuring cable connection to CLM 431

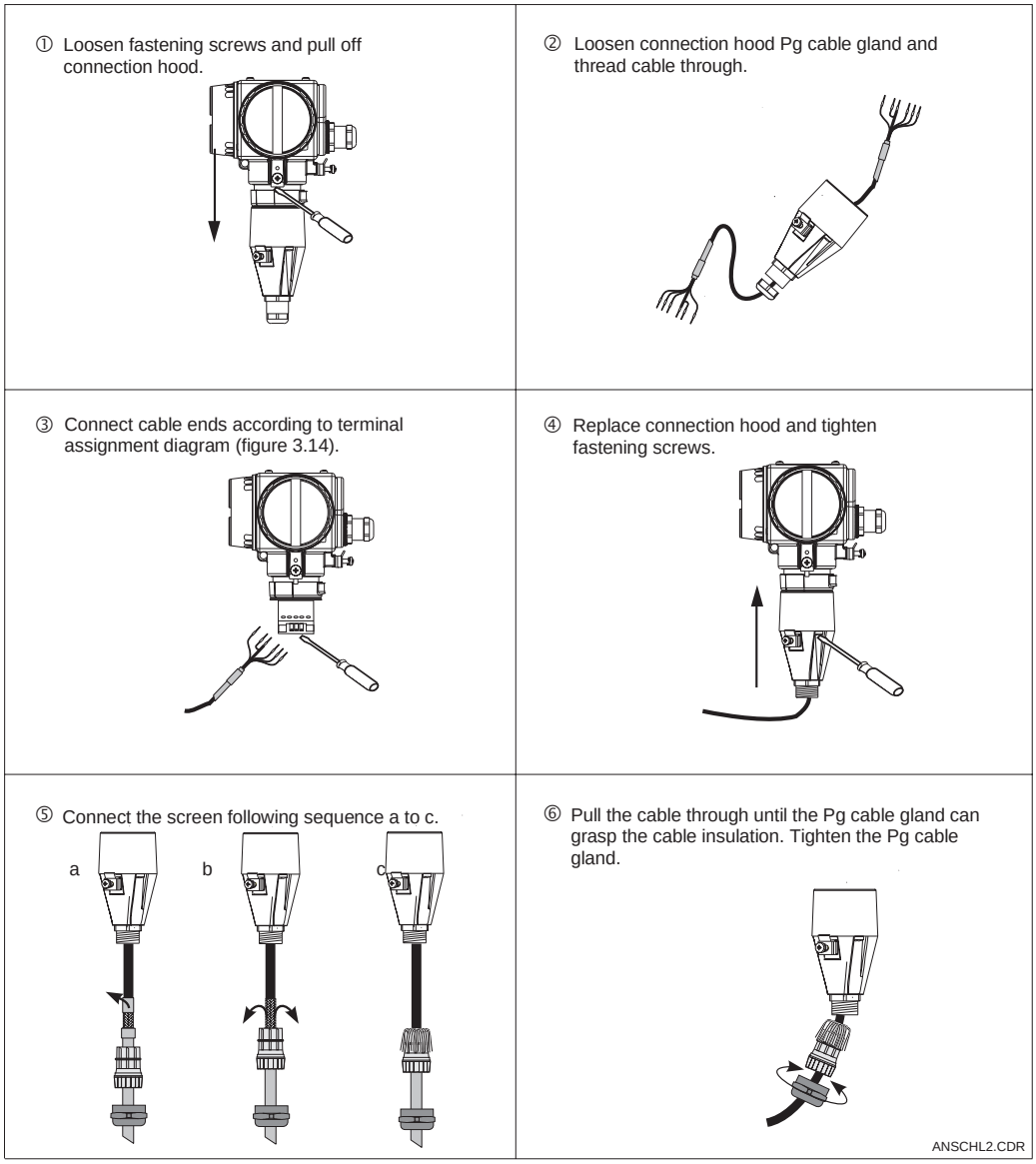


Fig. 3.15 Measuring cable connection

Note:

The screen can also be connected to the screen terminal on the terminal block.

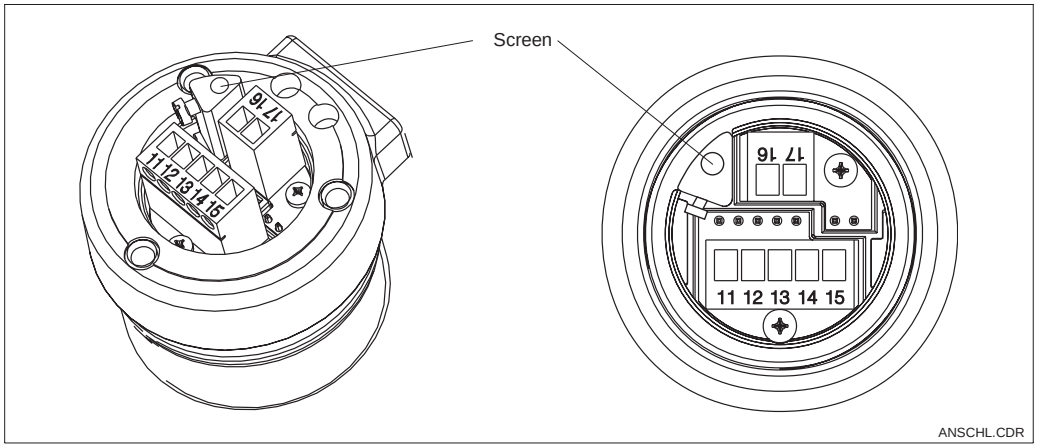


Fig. 3.16 Terminal block

3.5 Electrical connection

The measuring transmitter MyPro CLM 431 / CLD 431 has separate connection compartments for the power supply and measuring cell connections.

The terminals for the two-wire line are located under the screwed cover on the right side of the instrument.

Proceed as described below to connect the MyPro CLM 431 / CLD 431:

- Connect the MyPro CLM 431 / CLD 431 transmitter to a 12 ... 30 V power source
- Ground the instrument via the outer ground terminal.
- Ground the two-wire line screen via the ground terminal in the connection compartment.

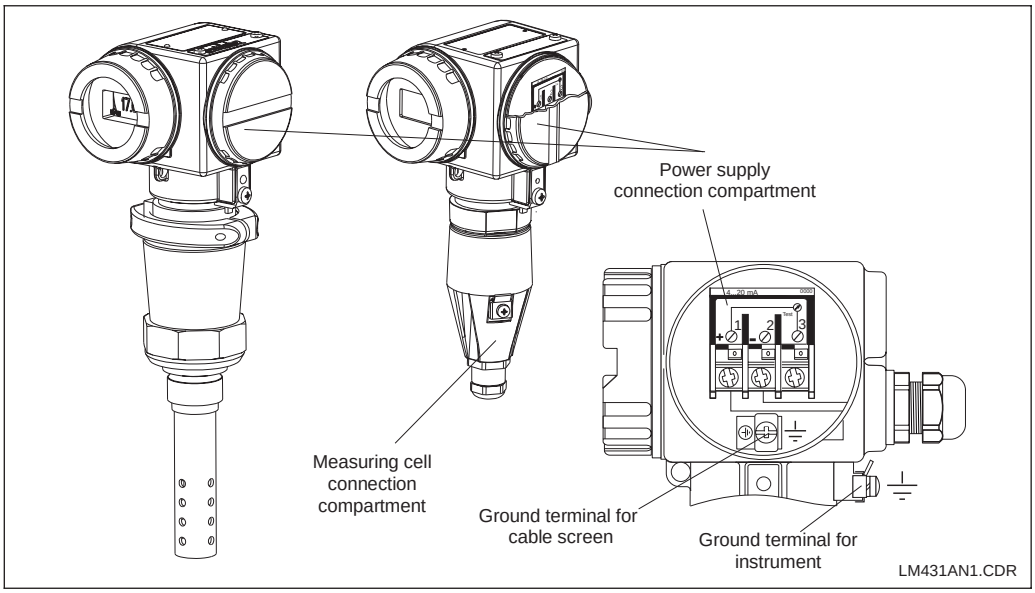


Fig. 3.17 Electrical connection compartment

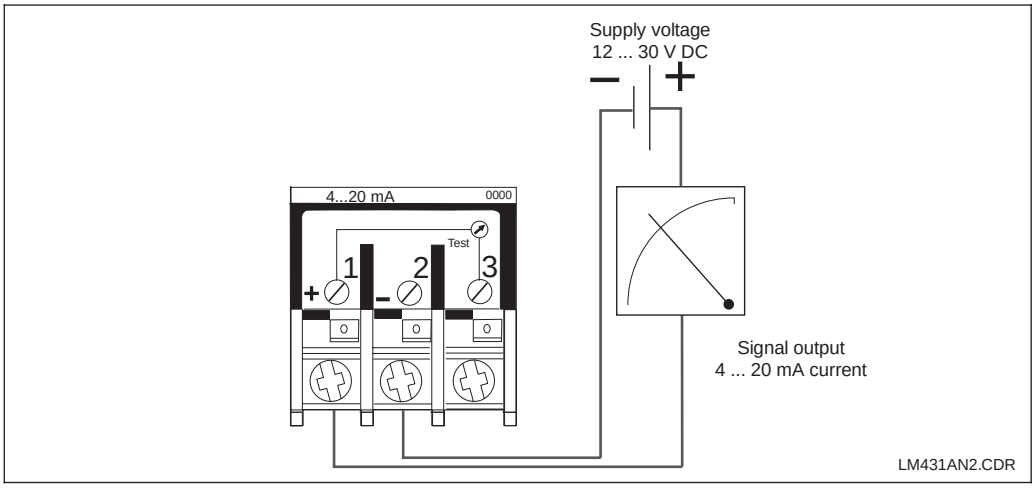


Fig. 3.18 Electrical connection

Note:

- Keep the screen ground line as short as possible. Connect the screen directly to the ground terminal. This also applies to connection of junction box VS.
- If the instrument is mounted on a post, ground the post to increase immunity to interference. Running the cable in the post will improve interference suppression.
- Immunity to interference is only guaranteed when the instrument is grounded via the shielded two-wire line.

Resistance

The required minimum supply voltage of the transmitter depends on the resistance of the evaluation instrument connected.

The following diagram shows the required supply voltage when connecting the HART interface and the maximum admissible resistance in the transmitter circuit.

The maximum admissible resistance R_{max} is derived from the following formula:

$$R_{max} = \frac{U_V - U_M}{I_{max}}$$

with U_V = supply voltage of the transmitter circuit (DC)

U_M = terminal voltage of the transmitter (12 V DC)

I_{max} = maximum current of the transmitter (22 mA)

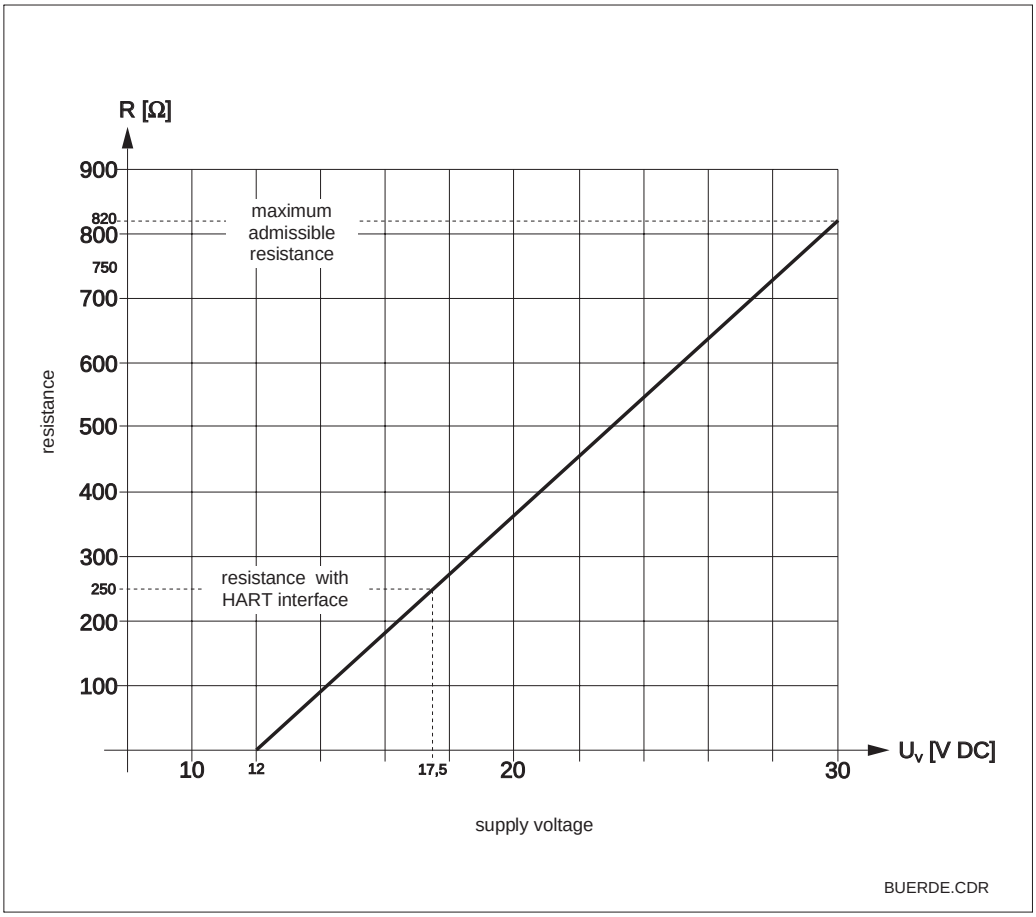


Fig. 3.19 Admissible resistance in the transmitter circuit

3.6 Connection of MyPro in Ex area

Connection of MyPro CLM 431-G

The CLM 431-G instrument approved according to directive 76/117/EEC may be installed in Ex area 1 or 2. Observing the European directive IEC 60079-14, the intrinsically safe sensor circuit (ia) may also pass through zone 0.

Connection of MyPro CLM 431-H

The CLM 431-H instrument approved according to directive 76/117/EEC may be installed in Ex area 1 or 2. Observing the European directive IEC 60079-14, the intrinsically safe sensor circuit (ia) may also pass through zone 0.

Connection of MyPro CLD 431-H

The CLD 431-H instrument approved according to directive 76/117/EEC may be installed in Ex area 1 or 2.

Only devices with an intrinsically safe output circuit may be connected to Ex versions of the measuring transmitter.

Warning:

The display and connection compartment covers must remain closed during operation.

Note:

Also observe the safety notes for instrument installation in explosive atmospheres in chapter 2.7 of these operating instructions.

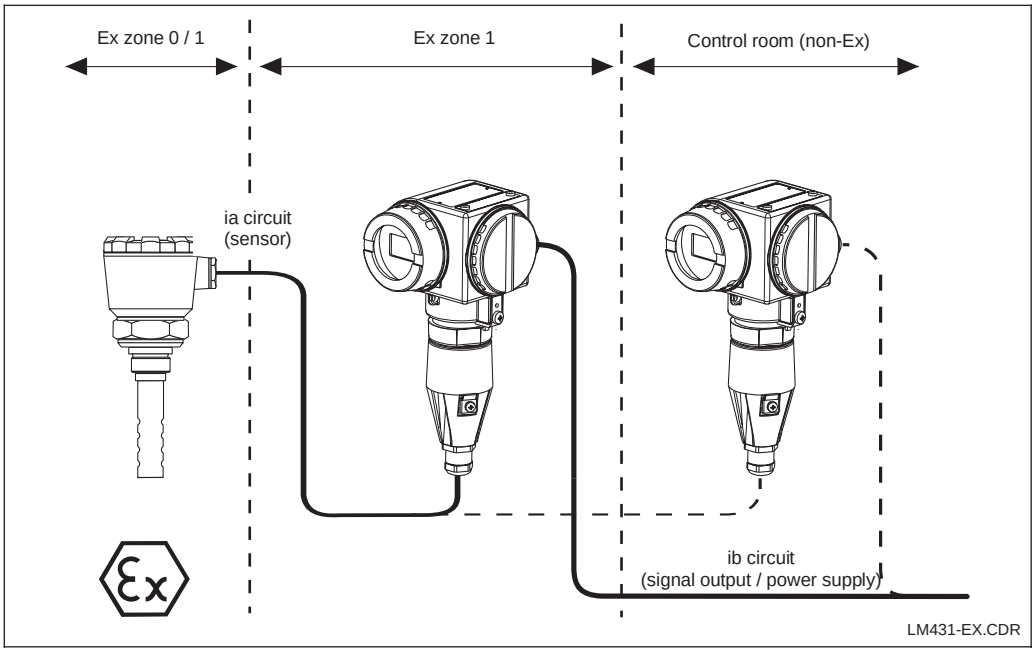


Fig. 3.20 Measuring transmitter and measuring cell in Ex area

4 Operation

4.1 Start-up

Note:

- Familiarise yourself with the operation of the measuring instrument before switching it on for the first time!
- Before power-up, check that all connections have been properly made!
- Make sure that the measuring cell is immersed in the medium to be measured or a calibration solution. This ensures that a plausible value will be displayed.

4.2 Power-up, factory settings

Fig. 4.1 Conductivity measurement

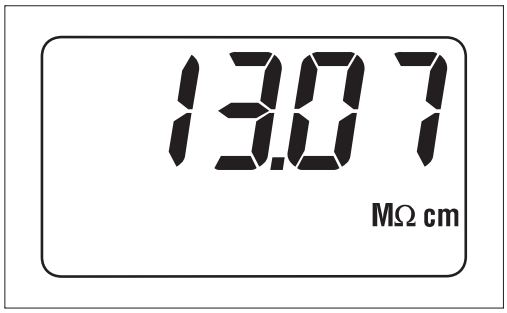


Fig. 4.2 Resistance measurement

The MyPro CLM 431 / CLD 431 does not have an “ON switch”. When power is applied, the instrument performs a self-test and then starts up in the measuring mode using the parameters last set. The display should be similar to one of the figures below. Of course, the display value may be different. µS/cm or mS/cm on the display stands for conductivity, MΩ cm or kΩ cm stands for resistance measurement.

If the display indicates a plausible value, the cell constant can be entered, allowing the transmitter to display the measured values correctly. The instrument is then ready for measurement.

Use the function “tYPE” to switch between the operating modes conductivity and resistance, see chapter 5.1.

Refer to chapters 4.6.4 and 5 for notes on calibration.

4.3 Operating concept / operating elements

The intelligent MyPro CLM 431 / CLD 431 transmitter can be operated in the field with 4 keys or via the HART interface (hand-held terminal or Commuwin II) or via Profibus PA.

The 4 keys are located on the side of the instrument under a hinged cover and can be actuated with a pointed object, such as, for example, the tip of a ball point pen.

The printing on the adhesive label above the key pad shows the key arrangement .

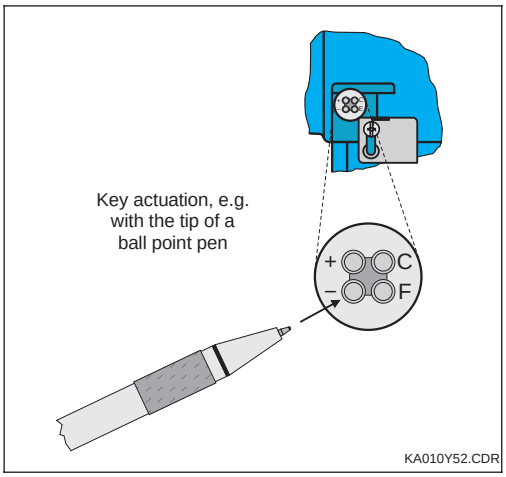


Fig. 4.3 Keypad

The following functions can be accessed in the field via the keypad:

Operating level 1

- Verification of active settings (secondary parameter)
- Error diagnosis (diagnostic parameters)
- Current interface settings (instrument parameters)
- Calibration

Operating level 2

This level comprises all other settings, e.g. switching from conductivity to resistance measurement.

Key functions at operating level 1:

+ Select secondary parameter / set values
– Select diagnostic parameters / set values
F Instrument configuration
C Sensor calibration

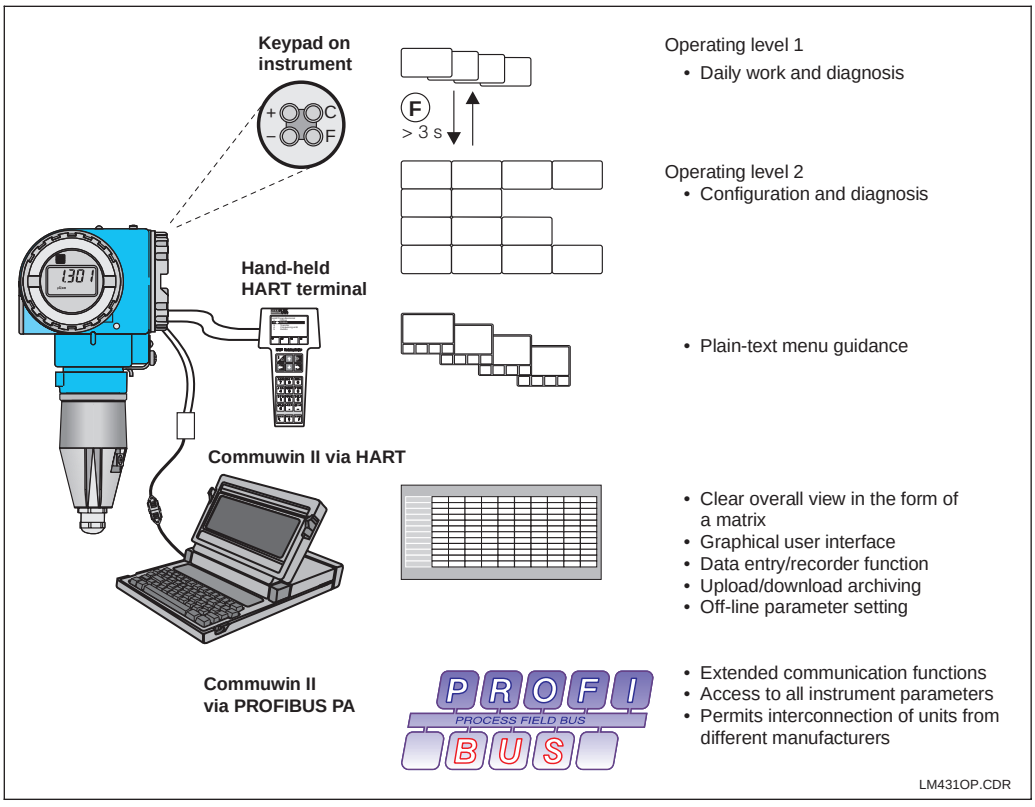
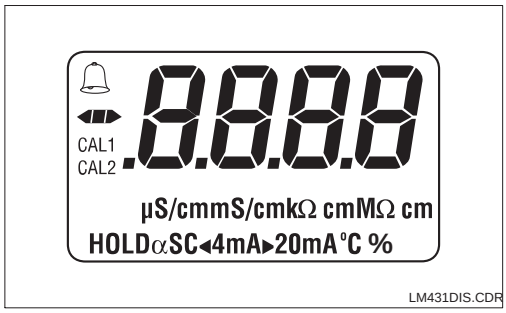


Fig. 4.4 Operation of MyPro CLM 431 / CLD 431 is possible via:
– keys on instrument
– hand-held HART terminal
– Commuwin II via HART
– Commuwin II via PROFIBUS-PA.

4.4 Display



The figure on the left shows the complete MyPro display.

Various symbols are displayed depending on the instrument settings.

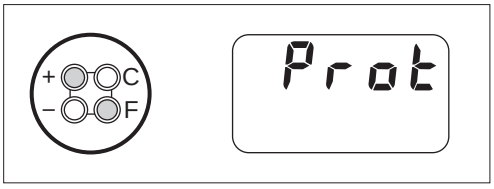
4.5 Locking concept

Access to instrument operation and write protection for field operation can be disabled via the keypad or the communication interface. The keypad has priority over the interface, i.e. an instrument which has been locked in the field cannot be unlocked via the communication interface.

Note:

- The previous locking status is retained after a power failure or reset.
- The factory setting (status at time of delivery) is 'unlocked'.

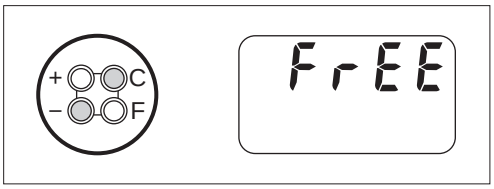
Press „**+**“ and „**F**“ once at the same time



Instrument is locked

Parameters can only be read in the field and via communication; „Prot“ (= write-protected) is displayed when operation is attempted

Press „**–**“ and „**C**“ once at the same time



Instrument is unlocked

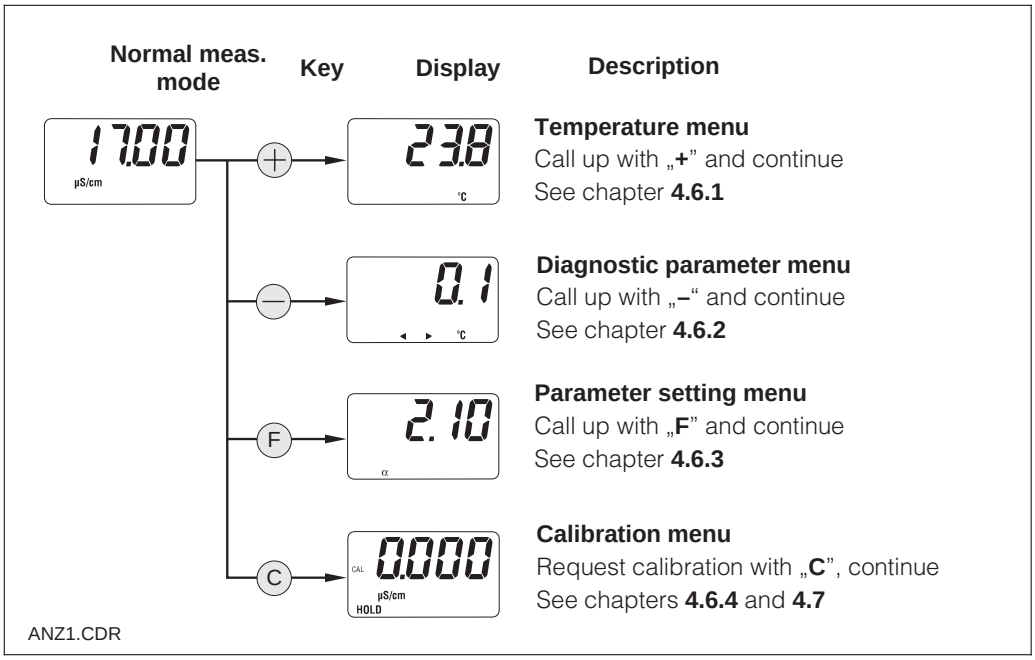
Unlocking / locking via interface and field operation (operating level 2):

See chapters 4.7 and 5.

4.6 Operating level 1

Display mode selection

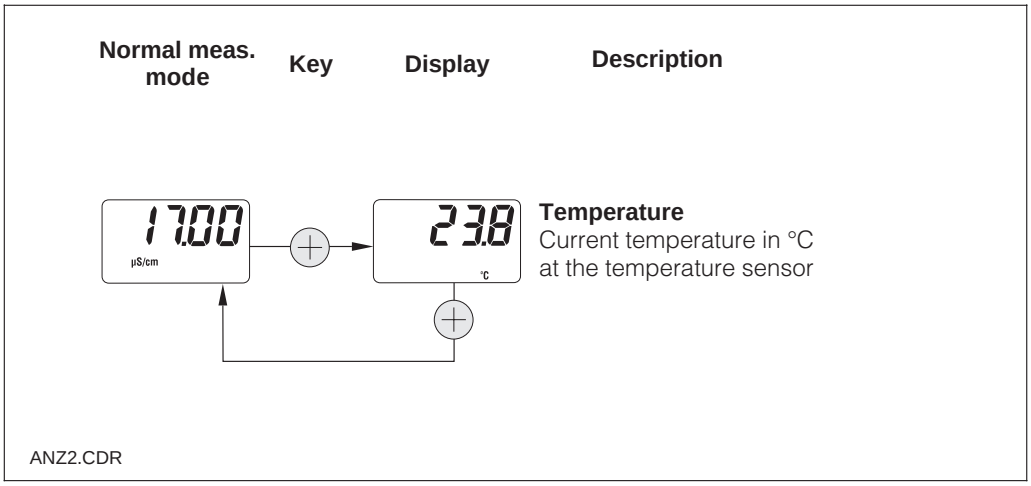
The display normally shows the currently measured value. The four operating keys are used to access the various display modes explained on the pages to follow.



4.6.1 Secondary parameter menu (temperature)

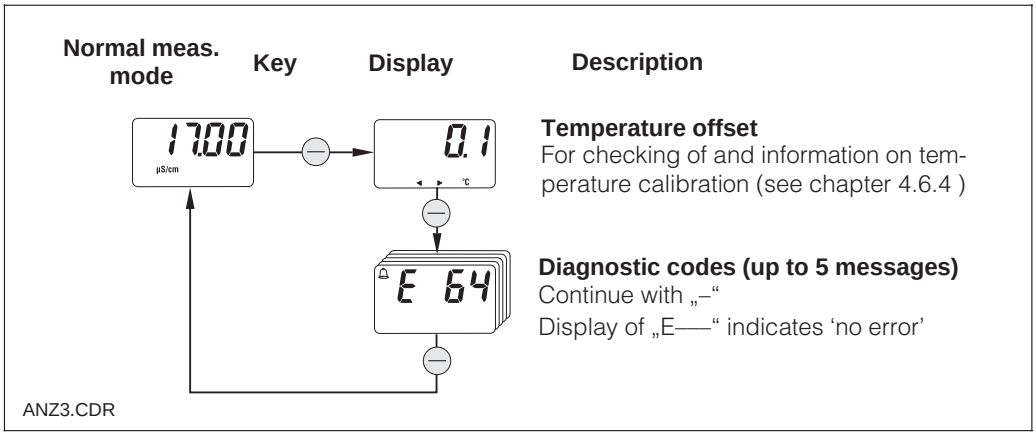
The secondary parameter menu is used to display parameters that influence the measured value (temperature).

If no other key is pressed for 30 s, the instrument automatically switches back to the measured value display.



4.6.2 Diagnostic parameter menu

The diagnostic parameters show the current temperature offset (from temperature calibration) and the diagnostic codes (error messages) that are active, beginning with the highest priority (Prio_1). If no other key is pressed for 30 s, the instrument automatically switches back to the measured value display.



4.6.3 Parameter settings

This function can be used to display and set the values that are essential for start-up. These are:

- Temperature coefficient (α value)
- Cell constant
- Meas. value for 4 mA current output
- Meas. value for 20 mA current output

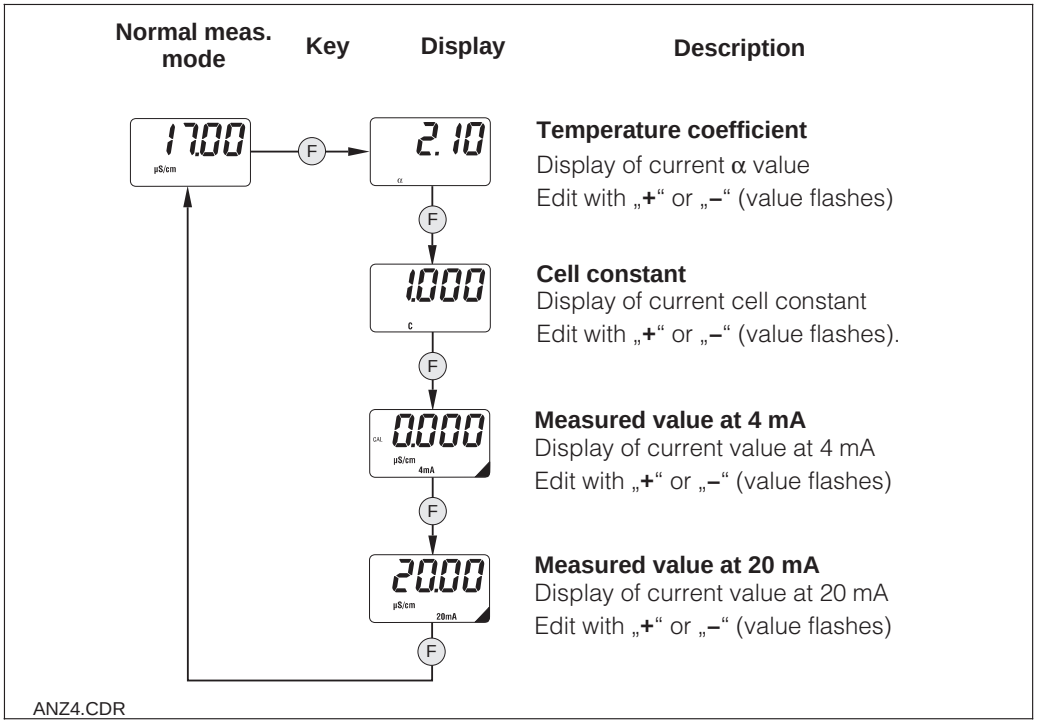
The value being edited flashes. When the desired value has been entered, it is accepted with „**F**”, and the system advances to the next parameter.

Adjustment ranges

Temperature coeff. α:	0.00 to 10.00 %/K
Cell constant C:	0.0025 to 99.99 cm^{-1}
Minimum distance 4/20 mA value:	20 µS/cm / 200 µS/cm 2 mS/cm / 20 mS/cm (dep. on meas. range)

Note:

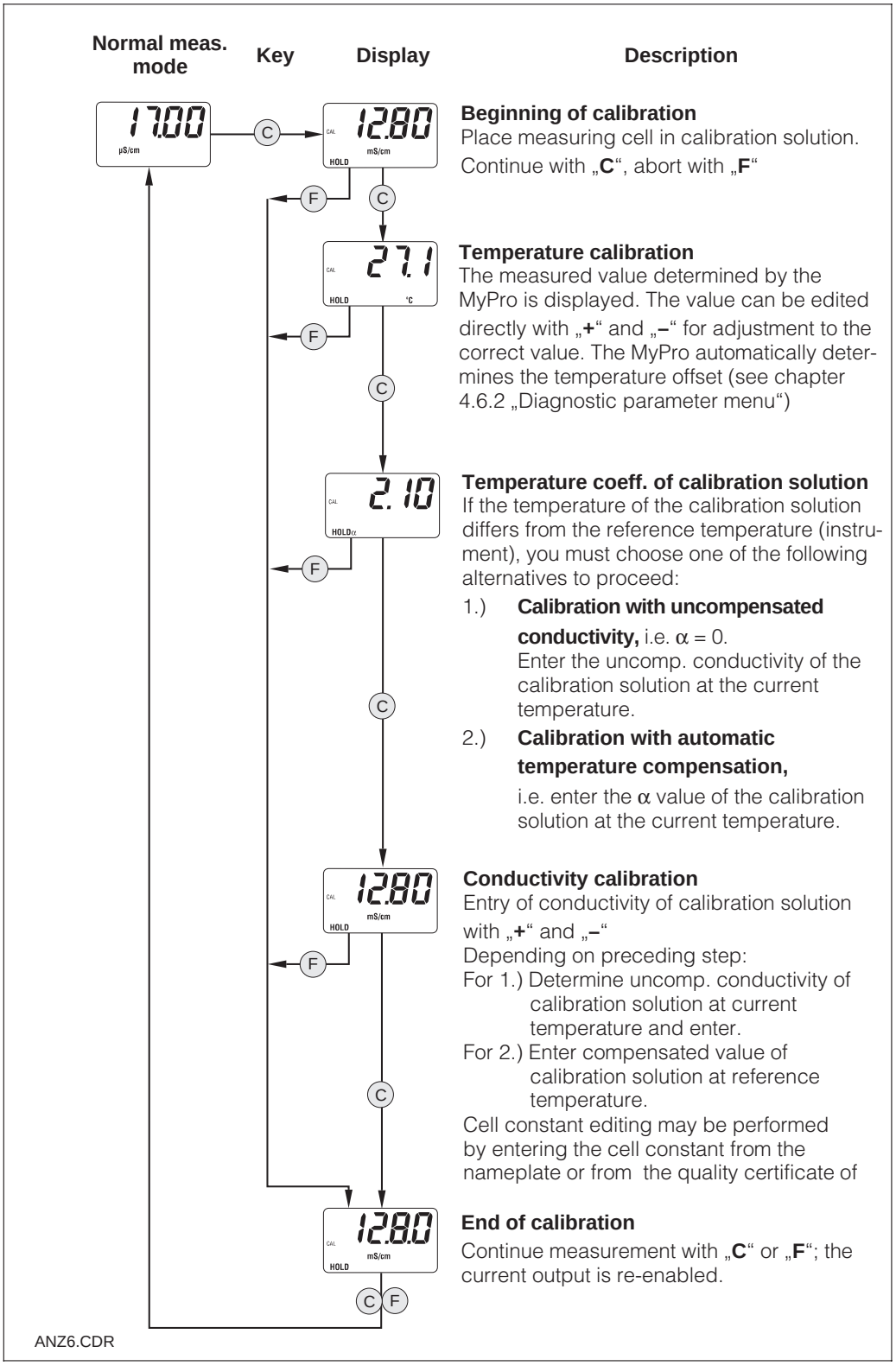
A minimum distance between the 4 and 20 mA values is required (see chapter 10) → an error is signalled if this condition is not fulfilled.



4.6.4 Calibration

The calibration menu of the MyPro CLM 431 / CLD 431 is used for temperature and conductivity calibration. The conductivity calibration, i.e. the determination of the cell constant, can be performed with or without automatic temperature compensation. The temperature coefficient and the uncompensated conductivity of the calibration solutions as a function of temperature are documented.

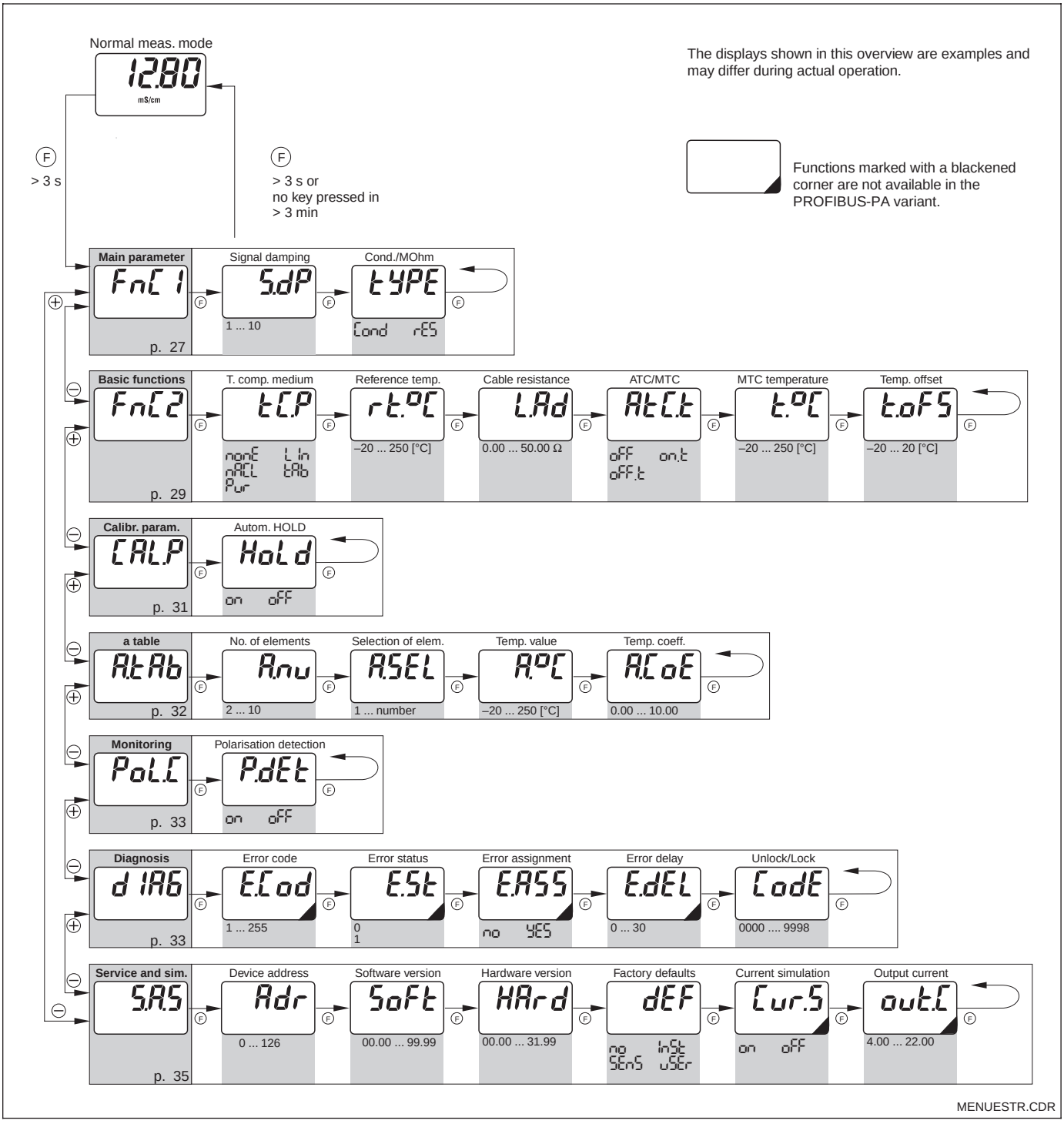
The calibration menu can be exited anytime by pressing the **„F“** key; an error message (calibration aborted) will be displayed.



4.7 Operating level 2

Operating level 2 covers all operating functions of the MyPro 431 / CLD 431 not included in level 1. These functions are arranged in menus by function group.

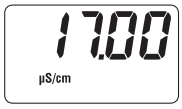
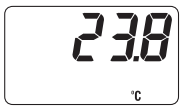
- This level is **accessed** from the normal measuring mode by pressing and holding the **„F“ key for more than 3 seconds**.
- Press the „**+**“ or „**–**“ key to select the desired function group.
- The function groups and functions within a function group are **accessed** by pressing the **„F“ key**.
- When the desired function appears on the display, the value or **selection can be changed with „+“ or „–“**.
- Press the **„F“ key** to **acknowledge** and proceed.
- The „advanced“ operating level is **exited** by pressing the **„F“ key for more than 3 seconds** or **automatically after 3 minutes** if no other key is pressed (value is not stored).



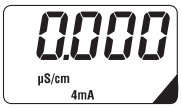
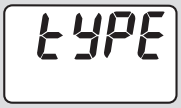
5 Functional description

This chapter contains detailed descriptions of and information on the individual MyPro functions referred to the matrix representation of the hand-held terminal or Commuwin II.

5.1 Main parameters

Function group: MAIN PARAMETERS				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Measured value 	VH 00	Displays the currently measured conductivity or resistance value.	–	
Temperature 	VH 01	Displays the currently measured temperature value (see chapter 4.6.1).  **Note:** This is only displayed if the temperature measurement is enabled (see VH 17: type of temperature compensation). **Value range:** –35.0 ... 250.0 °C	–	
Operating state	VH 02	Output of current operating state, e.g. indicates when field calibration is currently being performed.  **Note:** This function is only intended for operation with the Commuwin II user interface or the hand-held HART® terminal. **Commuwin:** Meas., cal. active, parameter setting	–	
Unit of main parameter	VH 03	Selects the unit for the parameter measured.  **Note:** • This is only relevant for the data transfer via the interface. The unit on the 4-digit field display changes automatically based on the auto range function. • Depending on operating mode cond. / MΩ **Value range:** µS/cm, mS/cm, S/m kΩ·cm, MΩ·cm	**µS/cm or MΩ·cm**	
Input damping 	VH 04	This function describes the transmitter's response to the input signal. The value entered here corresponds to the number of samples used for averaging. **Value range:** 1 ... 10	**3**	

Operating level 2

Function group: MAIN PARAMETERS				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Set 4 mA value 	VH 05	Entry of conductivity or resistance value for a current value of 4 mA (see chapter 4.6.3).  **Note:** A specific minimum distance from the 20 mA value must be observed. **Value range:** 0 ... 60 mS/cm 0 ... 200 MΩ·cm **Minimum distance:** Meas. value betw. 0 ... 199,9 µS/cm: 20 µS/cm / 25 kΩ·cm Meas. value betw. 200 ... 1999 µS/cm: 200 µS/cm / 0,25 MΩ·cm Meas. value betw. 2 ... 19,99 mS/cm: 2 mS/cm / 2,5 MΩ·cm Meas. value > 20 mS/cm: 20 mS/cm / 25 MΩ·cm	**0.0 µS/cm**	
Set 20 mA value 	VH 06	Entry of conductivity or resistance value for a current value of 20 mA (see chapter 4.6.3).  **Note:** A specific minimum distance from the 4 mA value must be observed. **Value range:** 0 ... 60 mS/cm 0 ... 200 MΩ·cm **Minimum distance:** Meas. value betw. 0 ... 199,9 µS/cm: 20 µS/cm / 25 kΩ·cm Meas. value betw. 200 ... 1999 µS/cm: 200 µS/cm / 0,25 MΩ·cm Meas. value betw. 2 ... 19,99 mS/cm: 2 mS/cm / 2,5 MΩ·cm Meas. value > 20 mS/cm: 20 mS/cm / 25 MΩ·cm	**20.00 µS/cm**	
Operating mode conductivity / resistance 	VH 09	Sets the transmitter operating mode to conductivity or resistance measurement.  **Note:** Changing the operating modes resets the current output values to default.	**conductivity or resistance**	

Functions marked this way are not available in the Profibus instrument variant.

Operating level 2

5.2 Basic functions

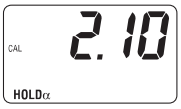
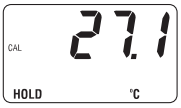
Function group: BASIC FUNCTIONS				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Remote calibration control	VH 10	This function controls the calibration sequence when operated via the interface (see chapter 4.6.4). **Note:** The measuring system can be calibrated in the field or via the interface (hand-held HART® terminal or Commuwin II).	**–**	
Temperature coefficient α 2.10 α	VH 11	Entry of linear temperature coefficient for the process in measuring mode. **Value range:** 0 ... 10 % /K	**2.10 % / K**	
Temperature compensation type tCP	VH 12	Selection of medium temperature compensation type. **Value range:** none = none Lin = linear NaCl = NaCl tAb = α value table Pur = pure water NaCl	**linear**	
Reference temp. rt.°C	VH 13	Reference temperature for automatic temperature compensation. **Value range:** –35 ... 250 °C	**25 °C**	
Cell constant 1.000 c	VH 15	Entry of cell constant or information on cell constant determined during calibration. **Value range:** 0.0025 ... 99.99 cm^{-1}	**1cm^{-1}**	
Line resistance LAd	VH 16	Entry of line resistance for conductivity measuring cell. **Note:** The line resistance does not affect the accuracy in the case of measured values below 1 mS. With measured values above 5 mS and line lengths (CYK 71) exceeding 10 m, the error is greater than 0.5% of the measuring value and therefore requires compensation. **Note:** The total line resistance of measuring cable CYK 71 is 0.17 Ω/m. **Value range:** 0.00 ... 50 ohms	**0**	

■ Operating level 2

Function group: BASIC FUNCTIONS				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Temperature compensation type AtC.t	VH 17	Switches the temperature measurement on/off and toggles between manual and automatic temperature compensation (MTC/ATC). **Note:** • If set to „off+MTC“, the preset MTC temperature is used for compensation • If set to „on+MTC“, the temperature can be additionally measured via a temperature sensor and output via the HART® interface or in the field • If set to „on+ATC“, the value measured by the temp. sensor is used for compensation **Value range:** off = off + MTC off.t = on + MTC on.t = on + ATC	**on + ATC**	
MTC temp. t.°C	VH 18	Entry of reference temperature for manual temperature compensation. **Value range:** –35.0 ... 250.0 °C	**25.0 °C**	
Temperature offset t.oFS	VH 19	Adjustment of temperature measurement by an offset value. Entry of an offset value or of the offset determined during calibration (at operating level 1, this value can only be viewed but not edited). **Note:** Only exists if temperature measurement has been switched on (see VH 17 „Temperature compensation type“). **Value range:** –20.0 ... 20.0 °C	**0.0 °C**	

Operating level 2

5.3 Calibration parameters

Function group: CALIBRATION PARAMETERS				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Entry of calibration solution 	VH 20	Conductivity of calibration solution. **Note:** The unit is µS/cm or mS/cm. **Value range:** 0.000 µS/cm to 9999 mS/cm	**1000 µS/cm**	
Temperature coefficient α of calibr. solution 	VH 21	Temperature coefficient of calibration solution for calibration with automatic temperature compensation. **Note:** The α value of the solution is temperature-dependent and must be determined for the current calibration temperature. **Value range:** 0.00 ... 10.00 % / K	**2.10 % / K**	
Temperature of calibr. solution 	VH 23	Temperature calibration: Field for entry of current calibration temperature. The temperature offset is automatically computed from this and displayed in field VH 19 “Temperature offset”. **Note:** • With ATC: Entry of actual temperature • With MTC: Entry of MTC calibration temp. **Value range:** –35 ... 250 °C	**–**	
Automatic HOLD during calibration 	VH 29	Activates or deactivates the automatic HOLD function for the current output during calibration. **Note:** Hold during calibration is always active for resistance measurement. **Value range:** Autom. HOLD during calibration off Autom. HOLD during calibration on	**on**	

Functions marked this way are not available in the Profibus instrument variant.

Operating level 2

5.4 Alpha table

In order to implement a special, medium-specific temperature compensation function, a table is stored in the MyPro CLM 431 / CLD 431. The α characteristic is entered in a table which may contain 2 to 10 elements. Each table element consists of an α value and the associated temperature.

The α table is activated via the "tab" mode in matrix position VH 12. However, the activation should not be performed unless the values have been edited (VH 60 ff) since changes in the α table become effective immediately (resulting in error message 150 in position VH 62).

Programming sequence for α table:
1. Enter number of elements (VH 60)
2. Select element 1 (VH 61)
3. Enter temperature value 1 (VH 62)
4. Enter α value 1 (VH 63)
5. Repeat steps 2 to 4 for all other elements of the table

Function group: α TABLE				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Number of elements 	VH 60	Entry of number of table elements. **Value range:** 2 ... 10	**2**	
Selection of element 	VH 61	Programming of the selected table element starts with the selection of the element. This is followed by the entry of the temperature value and corresponding α value for the table element. **Value range:** 1 ... number of elements	**1**	
Temperature value 	VH 62	Temperature value of current table element. **Note:** The temperature values must increase from one element to the next. The required minimum distance between temperature values is 10 K. Error message E150 indicates an incorrect temperature entry. **Value range:** –35 ... 250 °C	**0**	
α value 	VH 63	Temperature coefficient of current table element. **Value range:** 0.0 ... 10.00 % / K	**2.10 % / K**	

Operating level 2

5.5 Polarisation detection

Conductive conductivity measuring cells are characterised by a limited measuring range which mainly depends on the cell constant. However, the exact application range limits of a measuring cell also depend on other factors, such as, for example, frequency of measurement, electrode material, coating on electrode and medium to be measured, all of which complicate the determination of the application limit. The MyPro CLM 431 / CLD 431 transmitter employs a procedure permitting direct measurement of the polarisation effect. This method evaluates signals and issues an alarm whenever the cell constant has changed by more than 5% due to polarisation effects.

Function group **BASIC MONITORING FUNCTIONS**				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Polarisation monitoring P.dEt	VH 70	Switches the polarisation monitoring function on or off. **Note:** If polarisation monitoring is on and polarisation is detected, then error message E071 „Polarisation error“ is signalled (does not appear for MΩ measurement) **Value range:** On Off	**on**	

5.6 Diagnosis

Function group **DIAGNOSIS** **This function group can be used to define the error current assignments for each individual error and to disable (lock) field operation.**				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Selection of diagnostic code E.Cod	VH 80	Selection of a diagnostic (error) code (see chapter 7.2). **Value range:** E 1 ... E 150	**1**	
Error status E.St	VH 81	Display of status for selected diagnostic code. **Note:** The error status can be evaluated with the hand-held HART® terminal or with the Commuwin II user interface. **Value range:** 0 = inactive 1 = active	**depending on code**	

■ Operating level 2

Function group **DIAGNOSIS** **This function group can be used to define the error current assignments for each individual error and to disable (lock) field operation.**				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Error assignment EASS	VH 82	This function is used to define whether or not an error current of 22 mA is output for the selected error code on the current output. **Note:** If set to „**yes**“ (effective), an error current is output for an error set by the MyPro. A diagnostic code with the setting „**no**“ (not effective) has no effect on the current output. **Value range:** yES = 1 no = 0	**depending on code**	
Error current delay EdEL	VH 83	Sets the delay for a diagnostic code for which the error current assignment „**yes**“ (effective) has been set. If such a diagnostic code is set by the MyPro, this error becomes effective as an error current after the delay defined here. **Note:** This delay applies to all diagnostic codes. **Value range:** 0 ... 30 s	**2 s**	
Unlock/Lock CodE	VH 89	Unlock/locks field operation (see chapter 4.5). **Note:** Field operation can be locked and unlocked with the hand-held HART® terminal, with the Commuwin II user interface or in the field. Locking via the keypad has precedence over software locking. **Note:** 0097 = instrument unlocked (any other entry locks the instrument) 9999 = instrument locked in field with key combination “+” and “F” (unlocking via the HART® interface or via operating level 2 is not possible) **Value range:** 0000 ... 9998	**0097**	

Functions marked this way are not available in the Profibus instrument variant.

Operating level 2

5.7 Service and simulation

Function group: SERVICE/SIMULATION				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Default	**Customer**
Diagnostic code E 64	VH 90	Displays the active diagnostic codes with the highest priority levels (see chapters 4.6.2 and 7.2). **Value range:** E 1 ... E 150	**–**	
Device address Adr	VH 92	Entry of device address. **Note:** Only available for PROFIBUS-PA. **Value range:** 0 ... 126	**126**	
Software version SoFt	VH 93	Displays the software version of the instrument.	**depends on instrument version**	
Hardware version HArd	VH 94	Displays the hardware version of the instrument.	**depends on instrument version**	
Factory settings (set default) dEF	VH 95	This function is used to selectively reset the data areas of the instrument to the factory settings. **Value range:** no = 0 = no reset Inst = 1= instrument (data specific to instrument) Sens = 2 = sensor (data specific to sensor) USEr = 3 = user (combination of 1+2)	**no**	
Output current simulation Cur.S	VH 98	This function is used to switch the output current simulation on or off. **Note:** Reset back to „**0**“ (simulation off) after simulation. **Value range:** oFF = 0 = off on = 1 = on	**0**	
Current value OutC	VH 99	Entry of a current value (independent of the measurement) to be output at the current output. **Value range:** 4.00 ... 22.00 mA	**10 mA**	

Functions marked this way are not available in the Profius variant.

Operating level 2

5.8 User info

Function group: USER INFO				
Function/display	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Tag number	VH A0	Entry of a measuring point designation (tag number). **Value range:** Any sequence of 8 alphanumeric characters. **Note:** This function is only available for operation via the Hart interface but not via PROFIBUS.	**“ ” (8 spaces)**	

Operating level 2

6 Interfaces

6.1 HART®

6.1.1 HART® with hand-held terminal or HART® Communicator

In addition to field operation, the MyPro CLM 431 / CLD 431 transmitter can also be accessed via the universal hand-held terminal DXR 275 or a PC with a HART® modem (Commubox) using the HART® protocol to query or change parameter settings. This chapter contains essential information on:

- electrical connection
- operation of HART Communicator
- E+H operating matrix for HART®

Note:

Refer to the DXR 275 operating instructions for details on the hand-held HART terminal.

Connection of hand-held terminal DXR 275

There are two alternatives for connecting the hand-held terminal (see fig. 6.1.):

- Direct connection to the measuring transmitter via terminals 1 and 2
- Connection via the 4 ... 20 mA analog signal line

In both cases, the measuring circuit must have a resistance of at least 250 Ω between the power source and the hand-held terminal. The max. load at the current output depends on the supply voltage. The measuring transmitter input voltage for the maximum current consumption of 22 mA must be at least 12 V DC.

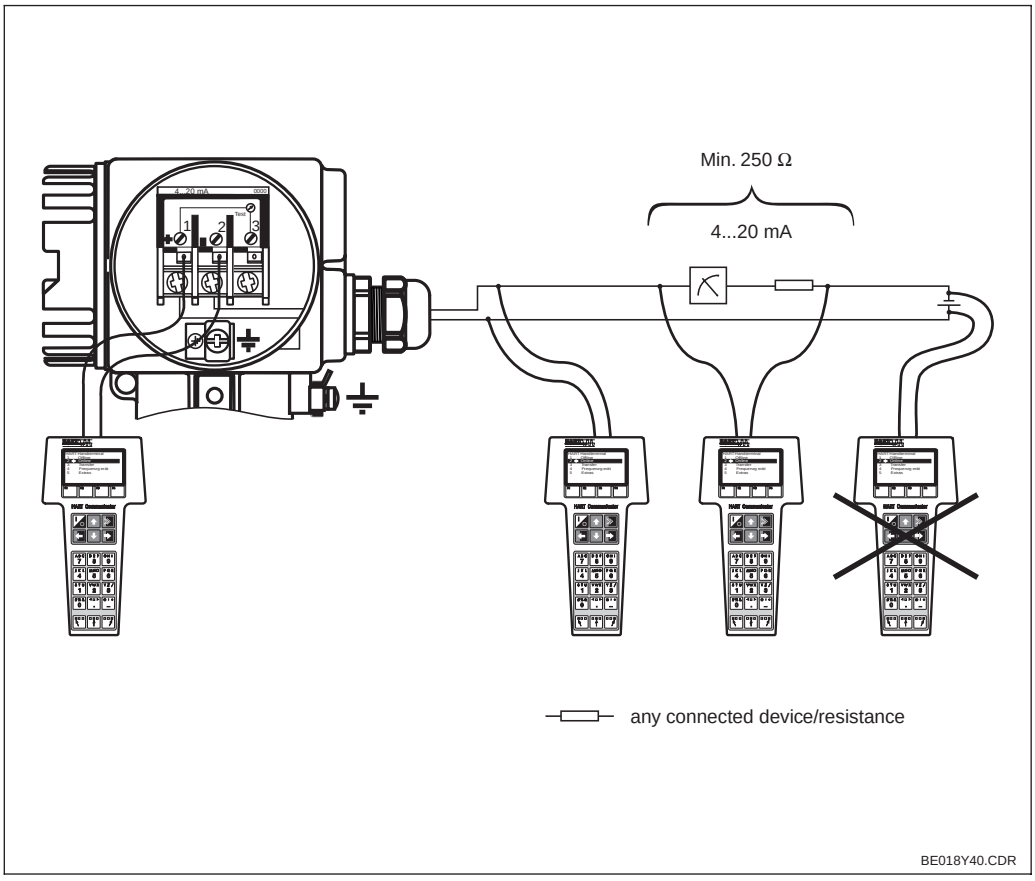


Fig. 6.1 Electrical connection of hand-held HART® terminal

Operation of MyPro CLM 431 / CLD 431 with the HART® Communicator

Operating the MyPro CLM 431 / CLD 431 measuring system via the hand-held terminal is quite different from field operation via the pushbuttons on the keypad. When using the HART® Communicator, all MyPro CLM 431 functions are selected at different menu levels (see figure 6.2) and with the aid of a special E+H operating menu (see figure 6.3).

Note:

- The MyPro measuring instrument can only be controlled with a HART® Communicator if the proper software (DD = device description of MyPro CLM 431 / CLD 431) is installed in the Communicator. If this is not the case, the memory module may have to be replaced, or the software may have to be adapted. Contact E+H Service if you have any questions.
- All MyPro functions are described in detail in chapter 5.

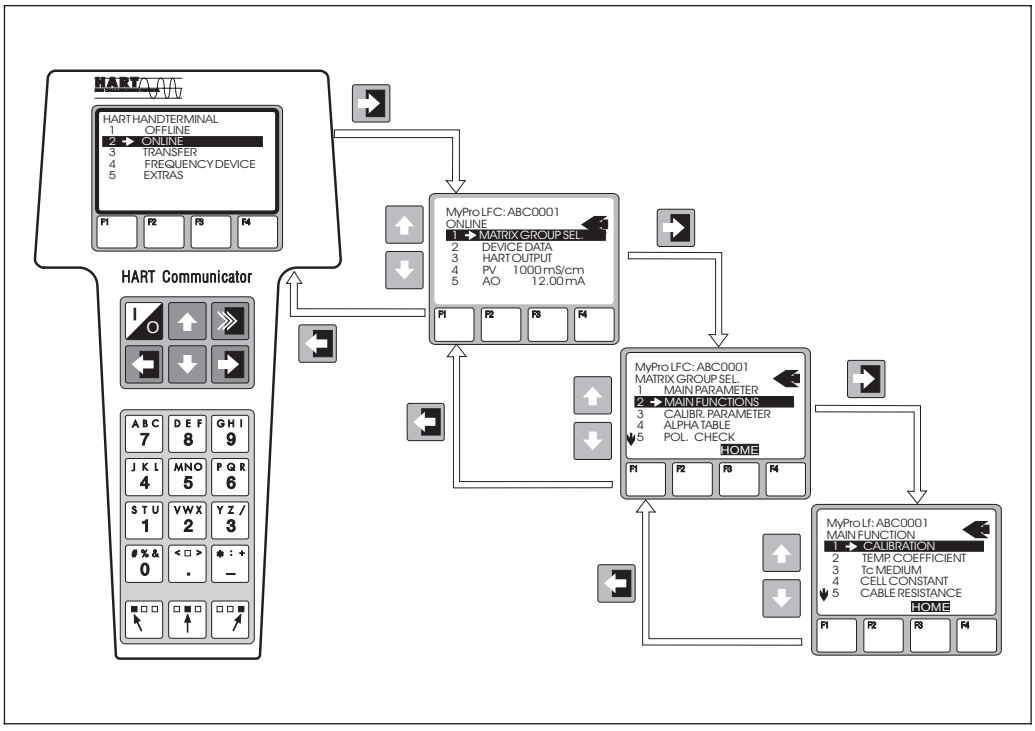


Fig. 6.2 Operation of hand-held HART terminal

Procedure:

1. Switch on the hand-held terminal:
   a) Measuring instrument not connected
      ➜ The HART® main menu appears. This menu level appears for any HART® programming, i.e. independent of the instrument type. Refer to the „Communicator DXR 275“ operating instructions for further information.
   b) Measuring instrument is connected ➜ The program goes directly to the „Online“ menu level.

The „Online“ menu level is used to display the current data measured, such as conductivity, temperature, etc., and also allows you to access the MyPro CLM 431 / CLD 431 operating matrix via the „matrix group selection“ (see figure 6.2). All function groups and functions accessible through HART are displayed in this matrix in a systematic arrangement.

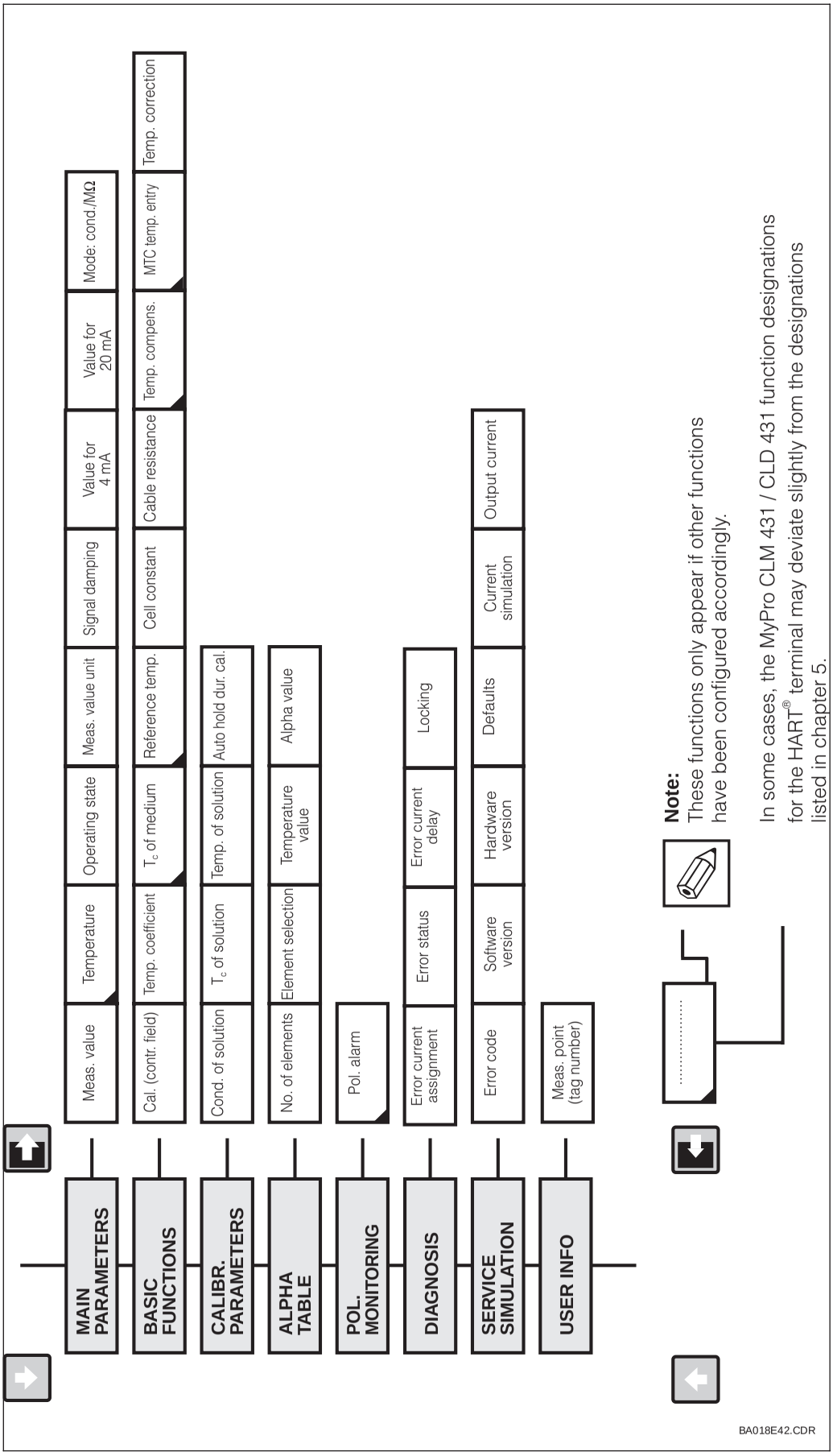
2. The function group is selected using „matrix group selection“ (e.g. basic functions), and then the desired function, e.g. remote calibration. All settings or numeric values relating to the function are immediately displayed.

3. Enter numeric value or change setting as required.

4. Press function key „F2“ to call up „SEND“. Press the F2 key to transfer all the values entered/ settings changed with the hand-held terminal to the MyPro CLM 431 / CLD 431 measuring system.

5. Press the HOME function key „F3“ to return to the „Online“ menu level. Here, you can read the current values measured by the MyPro CLM 431 / CLD 431 instrument with the new settings.

HART® operating matrix



If the instrument has been locked in the field, the parameters cannot be changed via the hand-held terminal (see chapter 4.5)

Fig. 6.3 HART® operating matrix for MyPro CLM 431 / CLD 431 (conductive conductivity measurement)

6.1.2 HART® with Commuwin

Description

The MyPro CLM 431 / CLD 431 measuring transmitter can also be operated via its HART® interface using Commuwin II. Commuwin II is a graphical control program for intelligent measuring instruments and can handle various communication protocols. The program supports the following functions:

- On-line and off-line measuring transmitter parameter changes
- Loading and saving of instrument data (upload/download)

A program extension additionally supports recording of measured values on a line recorder.

Commuwin offers two alternatives for operation and parameter changes (**instrument data** menu):

- **Graphical operation**
- **Matrix operation**

Note:

Refer to the Commuwin II operating instructions (BA 124F/00/en) for a detailed description.

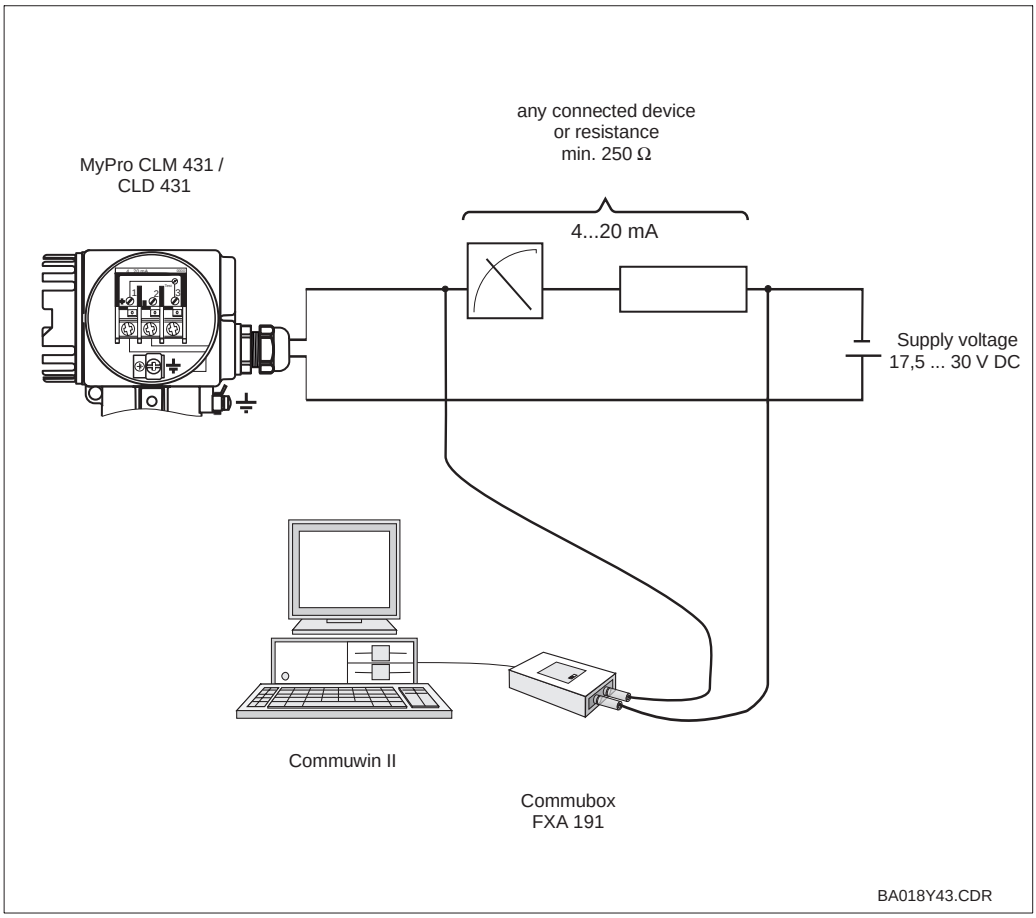


Fig. 6.4 Electrical connection of the Commubox

Commuwin II operating matrix

		H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0	**MAIN PARAMETERS**	Meas. value	Temperature	Operating state	Unit of meas. value	Signal damping	Value for 4 mA	Value for 20 mA			Oper. mode cond./MΩ
V1	**BASIC FUNCTIONS**	Calibration (control field)	Temp. coefficient	α value of medium	Reference temperature		Cell constant	Line resistance	Temperature compens.	Entry of MTC temp.	Temperature correction
V2	**CALIBR. PARAMETERS**	Conductivity of solution	α value of solution		Temperature of solution						Autom. HOLD dur. calibration
V3											
V4											
V5											
V6	**ALPHA TABLE**	Number of elements	Selection of elements	Temperature value	Alpha value						
V7	**POL. MONITORING**	Pol. alarm									
V8	**DIAGNOSIS**	Selection of error code	Error Status	Error assignment	Error current delay						Unlock/Lock
V9	**SERVICE/ SIMULATION**	Error code			Software version	Hardware version	Factory defaults			Current output simulation	Current value
VA	**USER INFO**	Meas. point (tag number)									

6.2 PROFIBUS-PA

Please refer to separate operating instructions for instruments equipped with the PROFIBUS interface.

7 Troubleshooting

7.1 Error indication

The MyPro CLM 431 / CLD 431 indicates errors by means of an alarm symbol flashing on the display. It also outputs an error current of 22 mA +/- 0.5 mA at the current output if configured accordingly (VH 80 – 83).

The error can then be identified in the diagnostic parameters via the diagnostic code. Up to five entries are listed according to priority.

7.2 Diagnostic codes (error codes)

The following table describes the diagnostic/error codes of this instrument variant.

The default error current assignment (active or not active) for each code is also listed.

Failure no.	Display	Measures	Error current assignment (default)
E1	EEPROM memory error	Switch instrument off and on again, return instrument to your local Endress+Hauser sales agency or exchange instrument.	active
E2	Instrument not adjusted, adjustment data invalid, no user data available or user data invalid (EEPROM error)		active
E7	Transmitter malfunction		active
E10	No temperature sensor connected or temperature sensor short-circuited (temperature sensor faulty)	Check temperature sensor and connections; if necessary, check instrument and measuring cable with temperature simulator.	active
E36	Measuring cell calibration range exceeded	Recalibrate measuring cell; if necessary, check measuring cell and connections; check instrument and measuring cable with conductivity simulator.	active
E37	Below measuring cell calibration range		active
E45	Calibration aborted	Repeat calibration.	active
E46	Current output parameter limits interchanged	Set value for 20 mA to a value > value for 4 mA.	active
E55	Below main parameter measuring range	Immerse sensor in conductive medium.	active
E57	Main parameter measuring range exceeded	Check measurement, process control and connections; if necessary, check instrument and measuring cable with simulator.	active
E59	Below temperature measuring range		active
E61	Temperature measuring range exceeded		active
E63	Below current output range	Check configuration; if necessary, check instrument and measuring cable with simulator.	not active
E64	Current output range exceeded	Check measured value and current assignment.	not active
E71	Inaccurate measurement/polarisation	Clean measuring cell; check table; select suitable measuring cell.	active
E77	Temperature outside α value table range	Check process / table assignment.	not active

Failure no.	Display	Measures	Error current assignment (default)
E80	Current output parameter range too small	Spread current output.	not active
E100	Current simulation active	Choose correct current output parameter.	not active
E101	Service function active	Switch off service function or switch instrument off and on again.	not active
E106	Download active	Wait for download to be finished.	not active
E116	Download error	Repeat download.	active
E150	Distance between temperature values in α value table too small or not monotonously increasing	Enter correct values in α value table (minimum distance between temperature values of 10 K required).	not active

8 Service and maintenance

8.1 Cleaning

We recommend using commercially available cleaning agents to clean the front of the instrument.
The instrument front is resistant to (DIN 42 115 test method):

- alcohol (short-term)
- diluted acids (max. 2 % HCl)
- diluted lyes (max. 3 % NaOH)
- soap-based household detergents

Note:

Do not use concentrated mineral acids or lyes, benzyl alcohol, methylene chloride or high-pressure steam to clean the front panel.

8.2 Repairs

Repairs may only be carried out by the manufacturer or through the Endress+Hauser service organization.
An overview of the Endress+Hauser service network can be found on the back cover of these operating instructions.

9 Accessories

The following accessories may be ordered separately:

- **Transmitter power supply units**
  - RN 221 power separator (non-Ex)
  - RN 221 Z power separator (Ex)
  - NX 9120 power supply (1 channel, non-Ex)
  - NX 9121 power supply unit (3 channels, Ex)
  - 1-channel transmitter power supply units with galvanically separated power output

Output voltage: typ. 24 V DC ±1 V
Output current: max. 33 mA
Current limiting: 38 mA ±5 mA

- **Hand-held HART® terminal DXR 275**

The hand-held terminal communicates with any HART-compatible unit via the 4 ... 20 mA line.

Refer to the E+H sales agency in your area for details and further information on programming (see back cover of these operating instructions for addresses).

- **Commuwin II with Commubox**

Commuwin II is a graphical, PC based operating program for intelligent measuring instruments.

Refer to the E+H-System Information SI 018F/00/en for further information on Commuwin II. A gratis update of the commuwin device description is available via internet http://www.endress.com.

The Commubox serves as the required interface between the HART® interface and the serial PC interface.

Refer to the E+H sales agency in your area for further information (see back cover of these operating instructions for addresses).

- **Extension cable CYK 71**
  Extension cable for conductive measuring cells for use with junction box VS.
  Order no. 50085333

- **Junction box VS**
  Junction box with receptacle and 7-pin connector for extension of measuring cable connection between measuring cell and instrument. Protection type: IP 65
  Order no. 50001054

10 Technical data

MyPro CLM 431 conductive

General specifications

Manufacturer	Endress+Hauser
Equipment designation	MyPro CLM 431 conductive

Physical data

Dimensions (H × W × D)	227 × 104 × 137 mm
Weight	max. 1.25 kg
Protection type	IP 65
Housing material	GD-AlSi 10 Mg, plastic-coated
Measured value display	liquid crystal display

Conductivity/resistance measurement

Measuring range with cell constant k = 1		0 ... 600 mS/cm (uncompensated) 0 ... 2 MΩ·cm (uncompensated)
Conductivity measurement Min. distance 4 ... 20 mA signal with cell constant k = 1		meas. value 0 ... 199,9 µS/cm: 20 µS/cm meas. value 200 ... 1999 µS/cm: 200 µS/cm meas. value 2,000 ... 19,99 mS/cm: 2,000 mS/cm meas. value > 20 mS/cm: 20 mS/cm
Resistance measurement Min. distance 4 ... 20 mA signal with cell constant k = 0,01		meas. value 0 ... 199,9 kΩ·cm: 25 kΩ·cm meas. value 200 ... 1999 kΩ·cm: 0,25 MΩ·cm meas. value 2,000 ... 19,99 MΩ·cm 2,5 MΩ·cm meas. value > 20 MΩ·cm 25 MΩ·cm
Measurement deviation[1] (with CLS 12)		±0.5 % of measured value ± 4 digits
Reproducibility[1] (with CLS 12)		±0.1 % of measured value ± 2 digits
Usable cell constant		k = 0.0025 ... 99.99 cm^{-1}
Max. sensor cable length	conductivity resistance	100 m 15 m
Max. resolution (in most sensitive measuring range)		10 nS/cm
Measuring frequency	conductivity resistance	299.75 ... 1077.6 Hz 32.5 ... 425 Hz

Temperature measurement

Temperature sensor connected	Pt 100
Measuring range of Pt 100	–35 ... +250 °C
Measurement deviation[1] (entire measuring range)	max. 0.5 % of MR
Measured value resolution	0.1 °C
Reproducibility[1]	± 0.1 K
Adjustable temperature offset	±20 K

Temperature compensation

Compensation types	linear, NaCl, ultrapure water, table
Range	–35 ... +250 °C
Reference temperature	adjustable; factory setting 25 °C

Signal output

Current range	4 ... 20 mA
Measurement deviation[1]	± 22 µA ± 0,5 µA · I_{real}/mA · ΔT /K ΔT = T_a – 25 °C for T_a ≥ 25 °C ΔT = 25 °C – T_a for T_a < 25 °C
Load	max. 820 Ω
Resolution	< 6 µA

[1] acc. to DIN IEC 60746 part 1, for nominal operating conditions

Electrical data

Supply voltage	+12 ... +30 V DC
Power consumption	max. 660 mW
Signal output	4 ... 20 mA, potential separated from sensor circuit
Error current signal output	22 mA ± 0.02 mA
HART® transfer: load	250 ... 820 Ω
HART® transfer: signal output	0.8 ... 1.2 mA (peak to peak)
Terminals, max. cable cross section	2.5 mm², screen 4 mm²

Vibration stability acc. to IEC 770

Mounting position	pipeline
Vibration frequency	10 ... 60 Hz
Maximum amplitude	0.21 mm

Ambient conditions

Electromagnetic compatibility (EMC)	Interference emission and interference immunity acc. to EN 61326-1:1998
Ambient temperature T_a (nominal operating conditions)	–15 ... +55 °C
Relative humidity (nominal operating conditions)	10 ... 95 %, non-condensing
Ambient temperature T_a (limit operating conditions)	–20 ... +60 °C (Ex: –20 ... +55 °C)
Storage and transport temperature	–20 ... +70 °C

Ex version of instrument

CLM 431-G

Intrinsically safe power supply and signal circuit, protection type EEx ib IIC T4	
Max. input voltage U_i	30 V DC
Max. input current I_i	100 mA
Max. input power P_i	750 mW
Max. internal inductance L_i	200 µH
Max. internal capacitance C_i	≈ 0, to PE = 5.3 nF

Intrinsically safe sensor circuit, protection type EEx ia IIC T4	
Max. output voltage U_o	± 5.4 (10.8) V DC
Max. output current I_o	320 mA
Max. output power P_o	200 mW
Max. external inductance L_o	100 µH
Max. external capacitance C_o	100 nF

CLM 431-H

Intrinsically safe power supply and signal circuit, protection type EEx ib IIC T4	
Max. input voltage U_i	30 V DC
Max. input current I_i	100 mA
Max. input power P_i	750 mW
Max. internal inductance L_i	200 µH
Max. internal capacitance C_i	≈ 0, to PE = 5.3 nF

Intrinsically safe sensor circuit, protection type EEx ia IIC T4	
Max. output voltage U_o	± 6.3 (12.6) V DC
Max. output current I_o	130 mA
Max. output power P_o	211 mW
Max. external inductance L_o	100 µH
Max. external capacitance C_o	100 nF

Supplementary documentation

TI CLS 12	order no. 50059349
TI CLS 13	order no. 50059350
TI CLS 15	order no. 50065950
TI CLS 19	order no. 50065951
TI CLS 21	order no. 50059352

MyPro CLD 431 conductive

General specifications

Manufacturer	Endress+Hauser
Equipment designation	MyPro CLD 431 conductive

Physical data

Length with CLS 12	321 mm
Process connection	G1 thread
Weight	approx. 2 kg
Protection type	IP 65
Housing material	GD-AlSi 10 Mg, plastic-coated
Measured value display	liquid crystal display

Conductivity/ resistance measurement

Measuring cell	CLS 12
Conductivity measuring range version CA version CB	0.04 ... 20 µS 0.1 ... 200 µS
Resistance measuring range version CA version CB	0.05 ... 25 MΩ ·cm 0.005 ... 10 MΩ ·cm
Cell constant	k = 0.01/cm in 0.04 ... 20 µS/cm measuring range k = 0.1 /cm in 0.1 ... 200 µS/cm measuring range

Other data

Same as CLM 431 conductive

Ex version of instrument

CLD 431-H

Intrinsically safe power supply and signal circuit, protection type EEx ia/ib IIC T4	
Max. input voltage U_i	30 V
Max. input current I_i	100 mA
Max. input power P_i	750 mW
Max. internal inductance L_i	200 µH
Max. internal capacitance C_i	≈ 0, to PE = 5.3 nF

Supplementary documentation

TI CLS 12	order no. 50059349

Subject to modifications.

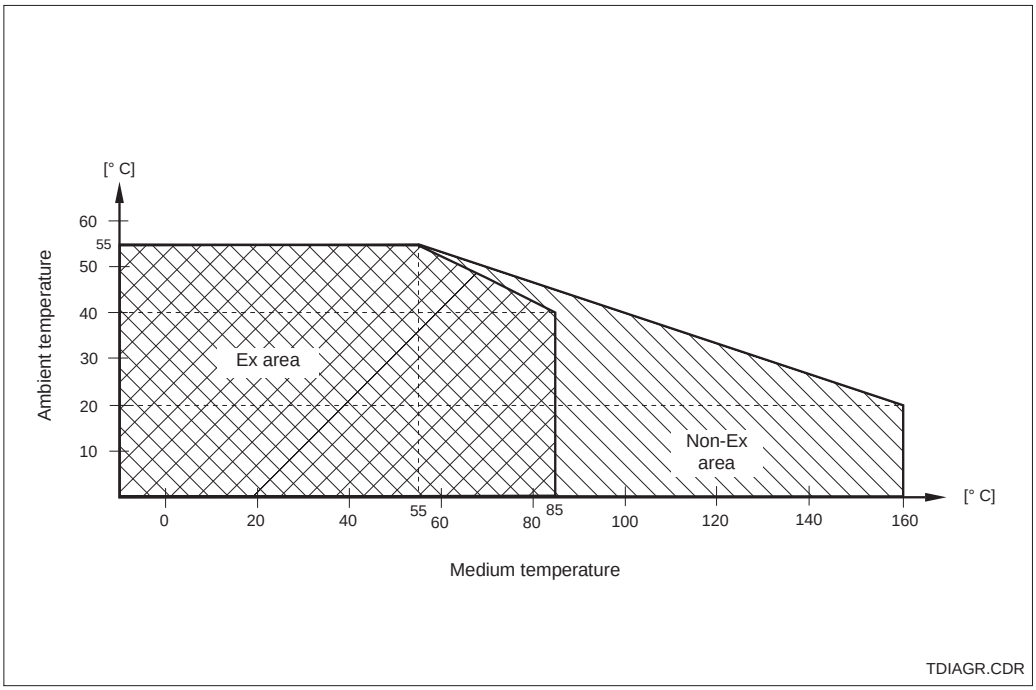


Fig. 10.1 Permissible temperature ranges of MyPro CLD 431

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